

A NEW AND COMPLETE  
DICTIONARY  
OF  
ARTS and SCIENCES;  
COMPREHENDING ALL

The Branches of Useful Knowledge,

WITH  
ACCURATE DESCRIPTIONS as well of the  
various MACHINES, INSTRUMENTS, TOOLS, FIGURES,  
and SCHEMES necessary for illustrating them,

AS OF  
The Classes, Kinds, Preparations, and Uses of NATURAL  
PRODUCTIONS, whether ANIMALS, VEGETABLES,  
MINERALS, FOSSILS, or FLUIDS ;

Together with  
The KINGDOMS, PROVINCES, CITIES, TOWNS, and  
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By a SOCIETY of GENTLEMEN.

————— *Huc undique Gaza*  
*Congeritur* ————— VIRG.

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V O L. II.

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L O N D O N :  
Printed for W. OWEN, at Homer's Head, in Fleet-Street.  
MDCCLIV.





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## D A B

**D**, One of the letters of the alphabet, the fourth in order, and the third consonant, answering to the hebrew daleth, and greek delta.

As a numeral, D denotes 500; and with a dash over it, thus  $\overline{D}$ , 5000. Used in abbreviation, it has various significations: thus, D. stands for doctor, as M. D. doctor of medicine; D. T. doctor of theology; D. D. signifies doctor of divinity, or dono dedit; D. D. D. is used for dat, dicat, dedicat; and D. D. D. D. for dignum deo donum dedit.

Among musicians D marks, in thorough basses, what the italians call descanto, and intimates, that the treble ought to play alone, as T does the tenor, and B the bass. See the article DESCANT.

**D C**, in the italian music, an abbreviation of da capo, that is, from the head, or beginning; these words, or letters, being commonly met with at the end of rondeaus, or such airs and tunes as end with the first strain, intimate that the song is to be begun again, and ended with the first part.

Among roman writers D stands for *divus*, *decimus*, *devotus*, *diebus*, and *diutius*.

**DAB**, in ichthyology, the english name of a species of pleuronectes, with the eyes on the right side, obtuse teeth, a spine near the anus, and the body defended by rough scales.

**DABAS**, the name of cloths and woollen stuffs of the manufacture of Bas in Languedoc.

## D A C

**DABUIS**, a white cotton stuff, made in the East-Indies.

**DABUL**, a port town in the province of Decan, on the western coast of the hither India, north lat.  $17^{\circ} 30'$ . east long.  $72^{\circ} 30'$ .

**DACA**, a city of the province of Bengal, in the East-Indies, situated on a branch of the river Ganges, east long.  $89^{\circ}$  and north lat.  $23^{\circ} 30'$ .

**DA CAPO**. See D C, *supra*.

**DACE**, the english name of a species of cyprinus, very common in our rivers: it is longer and more slender than the roach, and has ten rays in the fin beside the anus. See the article CYPRINUS.

The dace is the slenderest and most rounded in the body of all the cyprini; its usual length is about six or seven inches, though it will grow much larger. See plate LXVII. fig. 1.

**DACOLITHUS**, in ichthyology, a species of cobitis, or loach, with a forked spine under each eye. See COBITIS.

**DACTYL**, *δακτυλος*, *daçtylus*, in antient poetry, a metrical foot, consisting of one long and two short syllables, as *ἀλκιμος*, and *μῦρμῦρ*.

The dactyl and spondee are the only feet or measures used in hexameter verses; the former being esteemed more sprightly, and the latter more solemn and grave. Accordingly, where great activity is signified, we find the dactyls used with much propriety, as in the following verses of Virgil.

*Quadrupedante putrem sonitu quatit ungula campum;* and,  
*Ferte citi ferrum, date tela, scandite muros.*

**DACTYL**, among antient botanists, the same with date. See the article **DATE**.

**DACTYLIC VERSES**, in antient poetry, hexameter verses ending with a dactyl. See **DACTYL** and **HEXAMETER**.

**DACTYLIOMANCY**, *daſtylomantia*, a sort of divination, performed by means of a ring; consisting chiefly in holding the ring suspended by a fine thread over a round table, on the edge whereof were made several marks with the twenty-four letters of the alphabet; and as the ring, in shaking or vibrating over the table, happened to stop over certain of the letters, these being joined together, composed the answer required.

**DACTYLIS**, in botany, a genus of the *triandria digynia* class of plants, the flower of which is a bivalve glume, and its fruit a single roundish seed, contained in the cup and flower.

**DACTYLUS**, **DACTYL**, in poetry. See the article **DACTYL**.

**DACTYLUS**, in zoology, a name used by the antients for the solen, or razor-fish. See the article **SOLE**.

**DACTYLUS IDÆUS**, the same with the belemnites. See **BELEMNITES**.

**DACZAJIE**, a silver money current in Persia, and worth five mamoudis. See the article **MAMOUDI**.

**DADO**, in architecture, the same with the dye. See the article **DYE**.

**DADUCHI**, in antiquity, priests of the goddess Ceres, so called, because, at the feasts and sacrifices of that goddess, they ran about the temple, carrying a lighted torch, which they delivered from hand to hand, till it had passed through them all. This they did in memory of Ceres's searching for her daughter Proserpine, by the light of a torch, which she kindled in mount Ætna.

**DÆMON**, *δαίμων*, a name given by the antients to certain spirits, or genii, which appeared to men, either to do them service, or to hurt them. The Platonists distinguish between gods, dæmons, and heroes. The gods are those whom Cicero calls *Dii majorum gentium*. The dæmons are those whom we call angels. See **ANGEL**. Christians, by the word dæmon, understand only evil spirits, or devils. Justin Martyr speaks of the nature of dæmons, as if he thought them not absolutely spiritual and incorporeal, for which

reason he attributes such actions to them as cannot be performed without the intervention of a body. It was a fabulous notion among the antient Hebrews, that Adam begot dæmons and spirits on certain succubuses. It is difficult to come at a satisfactory account of the dæmology of that people, and therefore it is no easy matter to explain what is meant by the worshipping of dæmons, or devils, which is the last species of idolatry, according to the division of the rabbins.

“The poets, says Minucius Felix, acknowledge the existence of dæmons; the philosophers make it a matter of dispute. Socrates was convinced of it, for he had a dæmon always at hand, by whose advice he governed himself in all his actions: the magi are not only acquainted with dæmons, but perform all their magical operations by the help of dæmons.”

The mahometans allow several sorts of dæmons; and the miners of Hungary, pretend that, while they are at work in the mines, they often see dæmons in the shape of little negro boys, doing them no other harm than often extinguishing their lights.

**DÆMONIAC**, a word applied to a person supposed to be possessed with an evil spirit, or dæmon. See **DÆMON**.

In the romish church there is a particular office for the exorcism of Dæmoniacs. See the article **EXORCISM**.

**DÆMONIACS**, in church-history, a branch of the anabaptists, whose distinguishing tenet is, that the devils shall be saved at the end of the world.

**DÆSION**, the macedonian name of the month called by the Athenians, anthesterion. See the article **ANTHESTERION**.

**DAFFODIL**, the same with the narcissus of botanists. See **NARCISSUS**.

**DAFFODIL-LILLY**, the lilio-narcissus of botanists. See **LILIO-NARCISSUS**.

*Sea-DAFFODIL*, a genus of plants called by latin writers *pancratium*. See the article **PANCRATIUM**.

**DAGO**, or **DAGERWORT**, the capital of an island of the same name in the Baltic, near the coast of Livonia, subject to Russia, east long. 21° 30', and north lat. 58° 45'.

**DAHGESTAN**, a country of Asia, bounded by Circassia on the north, by the Caspian Sea on the east, by Chirvein, a province of Persia on the south, and by Georgia on the west. Its chief towns are Tarku and Derbent, both situated on the Caspian Sea.

**DAHOMÉ**,

- DAHOMÉ**, a kingdom of Africa, on the Guinea-coast.
- DAILE**, in the sea-language, signifies the trough for carrying the water off the decks.
- DAILY**, the same with diurnal. See the article **DIURNAL**.
- DAIRY**, a house or building where milk, butter, cheese, &c. are made or kept. See the articles **MILK**, **BUTTER**, &c.
- DAISY**, the english name of a genus of plants, called by authors *bellis*. See the article **BELLIS**.
- Great DAISY**, the same with the *leucanthemum*. See **LEUCANTHEMUM**.
- Ox-eye DAISY**, a genus of plants, called by botanists *buphthalmum*. See the article **BUPHTHALMUM**.
- DACKER**, or **DICKER**, in our old statutes. See the article **DICKER**.
- DAKER-HEN**, a bird, otherwise called *ortygometra*. See **ORTYGOMETRA**.
- DALEA**, in botany, a genus of the *diadelphia decandria* class of plants, the corolla of which consists of five petals; four of which are equal and straight, and the fifth, or upper one, very small; the fruit is a roundish, acute pod, consisting of two valves, and containing only one cell: the seed is single.
- DALEBURGH**, the capital of the province of Dalia, in Sweden, situated on the western side of the Wener-lake, fifty miles north-east of Gottenburg, east lon. 13° and north lat. 59°.
- DALECARLIA**, a province of Sweden, abounding with iron and copper-mines.
- DALECARLIA**, is also the name of a river, which gives name to the above province.
- DALECHAMPIA**, in botany, a genus of the *polygamia monoecia* class of plants. There is no corolla, either in the male or female flower: the fruit is a globose-triangular scabrous capsule, with three cells: the seeds are roundish and solitary.
- DALKEITH**, a town of Scotland, in the county of Lothian, four miles south east of Edinburgh, west long. 2° 40', and north lat. 55° 50'.
- DALIA**, a province of Sweden, bounded on the north by Dalecarlia, on the east by Wermeland and the Wener-lake, on the south by Gothland, and on the west by Norway.
- DALLE**, a nominal money, used in keeping books of account in many cities of Germany. It is worth thirty-two sols lub, which make forty french sols.
- DALMATIA**, a frontier province of Europe, mostly subject to the Turks, but some towns on the sea-coast to the Venetians: it is bounded by Bosnia on the north, by Servia on the east, by Albania on the south, and by Morlachia and the gulph of Venice on the west.
- DAM**, among lawyers, signifies a boundary or confinement.
- DAM**, or **DYKE**. See the article **DYKE**.
- DAMA**, the **FALLOW-DEER**, in zoology, a species of the deer-kind, distinguished by its ramose and compressed, or palmed horns. See **CERVUS** and **DEER**.
- DAMAGE**, in law, is generally understood of a hurt, or hindrance attending a person's estate: but, in common law, it is a part of what the jurors are to inquire of in giving verdict for the plaintiff or defendant, in a civil action, whether real or personal: for after giving verdict on the principal cause, they are likewise asked their consciences, touching costs and damages, which contain the hindrances that one party hath suffered from the wrong done him by the other. See the article **COSTS**.
- DAMAGE-CLEER**, was a fee of the tenth part in the common pleas, and twentieth in the king's-bench and exchequer, formerly paid out of all the damages exceeding five marks, recovered in those courts, in actions on the case, covenant, trespass, and all others wherein the damages were uncertain.
- DAMAGE-FEASANT**, is when a stranger's beasts get into another man's ground, without license of the owner or occupier of the ground, and there do damage by feeding, or otherwise, to the grafs, corn, wood, &c. in which case the tenant whom they damage may therefore take, distrain, or impound them, as well in the night as in the day; but in other cases, as for rents and services, and such like, none may distrain in the night.
- DAMALA**, a sea-port town of the Morea in Greece, at the entry of the gulph of Engia.
- DAMAN**, a port town of the hither India, in the province of Guzurat, or Cambay, situated on the west coast, about eighty miles south of Surat, in 72° 20' east long. and 20° north lat. It is subject to the Portuguese.
- DAMARAS**, an indian taffeta, being a kind of armoisin. See **ARMOISIN**.
- DAMASCUS**, or **SCHAM**, the capital city of the south part of Syria, situated ninety

ty miles north east of Jerusalem, in a pleasant, extensive, and fruitful plain; east long.  $37^{\circ} 20'$ , and north lat.  $33^{\circ} 15'$ .

**DAMASK**, a silk-stuff, with a raised pattern, so as that the right side of the damask, is that which hath the flowers raised or fattened.

Damasks should be of dressed silk, both in warp and woof; and in France, half an ell in breadth: they are made at Chalons in Champagne, and in some places in Flanders, as at Tournay, &c. intirely of wool,  $\frac{3}{4}$  of an ell wide, and 20 ells long.

**DAMASK** is also applied to a very fine steel, in some parts of the Levant, chiefly at Damascus in Syria; whence its name.

It is used for sword and cutlafs-blades, and is finely tempered. See **STEEL**.

**DAMASKEENING**, or **DAMASKING**, the art or operation of beautifying iron, steel, &c. by making incisions therein, and filling them up with gold and silver wire; chiefly used for adorning sword-blades, guards and gripes, locks of pistols, &c.

Damasking partakes of the mosaic, of engraving, and of carving: like the mosaic, it hath inlaid work, like engraving, it cuts the metal representing divers figures, and as in chasing, gold and silver is wrought in relievo. There are two ways of damasking, the one, which is the finest, is when the metal is cut deep with proper instruments, and inlaid with gold and silver wire: the other is superficial only.

**DAMASONIUM**, in botany, a genus of plants called also alisma, and in english the starry-headed water-plantain. See the article **PLANTAIN**.

**DAMATRIUS**, a month called by the Athenians, pyanepsion. See the article **PYANEPSION**.

**DAMBEA**, the capital of Abyssinia, or Ethiopia, situated at the head of a lake, to which it gives name: east long.  $34^{\circ}$ , and north lat.  $15^{\circ}$ .

**DAMELOPRE**, a kind of bilander, used in Holland for conveying merchandize from one canal to another; being very commodious for passing under the bridges.

**DAMIANISTS**, in church-history, a branch of the antient accephali-severitæ. They agreed with the catholics in admitting the IVth council, but disowned any distinctions of persons in the Godhead; and professed one single nature, incapable of any difference; and yet,

they called God, the Father, Son and Holy Ghost.

**DAMIETTA**, a port-town of Egypt, situated on the eastern mouth of the river Nile, four miles from the sea, and a hundred miles north of Grand Cairo; east long.  $32^{\circ}$ , and north lat.  $31^{\circ}$ .

**DAMNATA TERRA**, among chemists, the same with caput mortuum. See the article **CAPUT**.

**DAMPS**, in natural history, noxious steams and exhalations, frequently found in mines, pits, wells, and other subterraneous places.

Damps are generally reckoned of four kinds. The first is the most ordinary; the workmen in the mines know when it is coming, by the flame of their candle's becoming orbicular, and by its lessening gradually till it goes quite out; as also, by the difficulty of breathing. Those that escape swooning, seldom suffer any harm by it: but such as swoon away, though they miss of downright suffocation, are, on their recovery, tormented with very violent convulsions. Their way of cure is to lay the person down on the earth, in a prone posture, with a hole dug in the ground under his mouth; if this fail, they fill him full of good ale, and if that will not do, they conclude the case desperate.

The second kind is the pease-bloom damp, being so called from its smell: this damp, they say, always comes in the summer-time, but hath never been known to be mortal. The miners in the Peak of Derbyshire, fancy it arises from the great number of red trefoil flowers, called by them honeysuckles, with which the limestone meadows of the peak abound. Probably the smell of this damp gives timely notice to get out of the way.

The third is the most pestilential, and the strangest of all, if what is said of it be true. They who pretend to have seen it, describe it thus. In the highest parts of the roof of those passages in a mine which branch out from the main grove, they see a round thing that hangs about the bigness of a foot-ball, covered with a film of the thickness and colour of a cobweb. If this bag should be broke by a splinter, or any other accident, the damp immediately flies out, and suffocates all the company. The miners have a way of breaking it at a distance, by means of a stick and long rope; and when they have done this, they purify the place with fire. They will

will have it, that it flows from the steam of their bodies and candles, ascends up into the highest part of the vault, and there condenses; and that in time, a film growing over it, it becomes pestilential.

The fourth is the fulminating, or fire-damp, whose vapour, being touched by the flame of a candle, presently takes fire, and has all the effects of lightening, or fired gun-powder. These are frequently met with in the coal-mines, and sometimes, though rarely, in the lead-mines.

The pernicious damps in mines, shew abundantly, that nature affords inflammable air in some cases; and we have found by experiments, that art can do the same, and that, very probably, on the same principles with the natural. Sir James Lowther, having collected the air of some of these damps in bladders, preserved it so well, that when brought up to London, it would take fire at the flame of a candle, on being let out at the orifice of a piece of tobacco-pipe. It is well known to all that are versed in chemical experiments, that most metals emit a great quantity of sulphureous vapours, during the effervescence they undergo in the time of their solutions, in their respective menstruums: this vapour, being received into bladders, in the same manner with the natural air of Sir James Lowther, has been found to take fire, in the like way, on being let out in a small stream, and answered all the phenomena of the natural kind.

**DAMSEL**, from the french *damoiselle*, or *damoiseau*, an appellation antiently given to all young people of either sex, that were of noble or genteel extraction, as the sons and daughters of princes, knights, and barons: thus we read of Damsel Pepin, Damsel Louis le Gros, Damsel Richard prince of Wales.

From the sons of kings this appellation first passed to those of great lords and barons, and at length to those of gentlemen, who were not yet knights.

At present, damsel is applied to all maids or girls, not yet married, provided they be not of the vulgar.

**DANAE**, in antiquity, a coin somewhat more than an obolus, used to be put into the mouths of the dead, to pay their passage over the river Acheron.

**DANCE**, an agreeable motion of the body, adjusted by art to the measures or tune of instruments, or of the voice,

Athenæus concludes, that in the early ages of antiquity, they accounted dancing an exercise becoming persons of honour and wisdom, and that, as such, it had been esteemed by the greatest men in all ages. Thus, Homer calls Merion a fine dancer, and says, that the graceful mein and great agility which he had acquired by that exercise, distinguished him above the rest in the armies of either Greeks or Trojans. Dancing was in very great esteem among the Greeks, even the Lacedæmonians encouraged it: but, at Rome, we find the custom was quite otherwise; for there, to use the words of Cicero, no man dances unless he is mad or drunk: Cicero reproaches Gabinus with having danced: and we read, that Domitian excluded several members from the senate for having danced.

Dancing in general, was by the antients divided into cubistic, spheristic, and orchestric: the cubistic dance was performed with certain wrestlings and contortions of the body; the spheristic with a sort of ball, or bowl play; but the orchestric was most usual, and what indeed was dancing properly so called.

Dancing is usually an effect and indication of joy, though Mr. Pallespratt assures us, that there are nations in South America, who dance, to shew their sorrow. It has been in use among all nations civilized and barbarous, though held in esteem among some, and in contempt among others. It has often been, and still is, sometimes, made an act of religion. Thus David danced before the ark to honour God, and express his excess of joy for its return into Zion. Among the Pagans it made a part of the worship paid to the Gods, it being usual to dance round the altars and statues; and at Rome, the salii, who were priests of Mars, danced through the streets in honour of that God. The poets made the Gods themselves dance. The Christians are not free from this superstition, for in popish countries certain festivals, particularly those of the sacrament, and passion of our Lord, are celebrated with dancing.

**Rope-DANCER**, *schoenobates*, a person who walks, leaps, dances, and performs several other feats upon a small rope, or wire.

The antients had their rope-dancers, who had four several ways of exercising their art; the first vaulted, or turned round the rope, like a wheel round its

axis, and there hung by the heels or neck. The second flew or slid from above, downwards, resting on their stomach, with the arms and legs extended. The third ran along a rope, stretched in a right line, or up and down. Lastly, the fourth, not only walked on the rope, but made surprising leaps and turns thereon.

This art is lately much improved, as well in this nation as in France, and several other parts of Europe; witness the admirable feats of Mr. Maddox, who, standing only with one foot on the wire, beats the drum, sounds the trumpet, plays the violin, &c. and all the while the wire is in full swing. The other feats which he performs on the wire by the help of a balance, are too many to be enumerated here.

**DANCETTE**, in heraldry, is when the outline of any bordure, or ordinary, is indented very largely, the largeness of the indentures being the only thing that distinguishes it from indented. See the article **INDENTED**.

There is also the bearing of a bend, called double dancette: thus, he beareth azure, a bend double dancette argent.

**DANCHE**, in heraldry, the same with dantelle, according to Guillim; but Columbian makes it the same with indented. See the articles **INDENTED** and **DANTELE**.

**DANDELION**, the english name of a genus of plants, called by Linnæus *leontodon*. See the article **LEONTODON**.

**DANEGETL**, a tax, or tribute, on every inch of land, imposed on our ancestors the Saxons by the Danes, on their frequent invasions, as the arbitrary terms of peace, and departure. It was first imposed as a continual yearly tax upon the whole nation, under king Ethelred. It was levied by William I. and II. but was released by king Henry the first; and finally abolished by king Stephen.

**DANK**, a piece of silver current in Persia, and some parts of Arabia, weighing the sixteenth part of a drachm. It is also a weight used by the Arabians to weigh jewels and drugs.

**DARIDAS**, a sort of india taffeta, made of silk drawn from plants.

**DARNAMAS**, the name of the best sort of cotton that comes from Smyrna, so called from a plain near that city.

**DANTELE**, in heraldry, the same with dancette. See the article **DANCETTE**.

**DANTIA**, in botany, a name used by Petiver, for the *isnardia* of Linnæus. See the article **ISNARDIA**.

**DANTZICK**, the capital of regal Prussia, in the kingdom of Poland, situated on the western shore of the river Wesel, or Vistula, which a little below falls into the Baltic Sea: east long. 19°, and north lat. 54°.

It is an excellent harbour, and has the best foreign trade within the Baltic.

**DANUBE**, one of the largest rivers in Europe, which, taking its rise in the Black Forest in Swabia, runs eastward through Bavaria, Austria, Hungary, and Turkey in Europe; discharging itself by several channels into the Pontus Euxinus, or Black Sea.

**DAPHNE**, in botany, a genus of the *ostandria monogynia* class of plants, the flower of which consists of a single petal; the tube is cylindric, imperforated, and longer than the limb, which is divided into four oval, acute, plane, patent segments: the fruit is a roundish berry, containing one cell; the seed is single, round and fleshy.

This plant is a strong cathartic, and too rough to be given with safety.

**DAPIFER**, the dignity or office of grand master of a prince's household. This title was given by the emperor of Constantinople to the czar of Russia, as a testimony of favour. In France the like officer was instituted by Charlemain, under the title of Dapiferat; and the dignity of dapifer is still subsisting in Germany, the elector of Bavaria assuming the title of arch-dapifer of the empire, whose office is, at the coronation of the emperor, to carry the first dish of meat to table, on horseback.

**DAPPLE-BAY**, in the manege; when bay horses have marks of a dark bay, they are called dapple-bays.

**DAPPLE-BLACK**; when a black horse has got spots or marks, more black or shining than the rest of his skin, he is called a dapple black.

**DARAPTI**, among logicians, one of the modes of syllogisms of the third figure, whose premises are universal affirmatives, and the conclusion is a particular affirmative: thus,

**DAR-** Every body is divisible;

**AP-** Every body is a substance;

**TI.** Therefore, some substance is divisible.

**DARBY**

**DARBY**, the capital of Darbyshire, situated on the river Darwent: west long.  $1^{\circ} 25'$ , and north lat.  $53^{\circ}$ .

It gives the title of earl to the noble family of Stanley, and sends two members to parliament.

**DARDANARIUS**, or **MONOPOLIST**, a name antiently given to such as occasioned a scarcity of provisions, particularly corn, by laying it up, to raise its price, in order to sell it again at an extravagant rate. See **MONOPOLY**.

**DARDANELLS**, two castles at the entrance of the Hellespont, where all ships going to Constantinople are examined: east long.  $27^{\circ}$ , and north lat.  $40^{\circ} 5'$ .

**DARE**, in ichthyology, the same with dace. See the article **DACE**.

**DARIEN**, a province of Terra Firma, in south America, being the narrow isthmus, which joins north and south America.

**DARII**, in logic, one of the modes of syllogism of the first figure, wherein the major proposition is an universal affirmative, and the minor and conclusion particular affirmatives: thus,

DA- Every thing that is moved, is moved by another;

RI- Some body is moved:

I. Therefore, some body is moved by another.

**DARK CHAMBER**. See the article **CAMERA OBSCURA**.

**DARK TENT**, a portable camera obscura, resembling a desk, and fitted with optic glasses, to take prospects of landscapes, buildings, &c.

**DARKING**, a market-town of Surrey, situated ten miles east of Guilford, west long.  $20'$ , and north lat.  $51^{\circ} 18'$ .

**DARLINGTON**, a market-town of the county of Durham, situated twenty miles south of the city of Durham. west long.  $1^{\circ} 15'$ , and north lat.  $54^{\circ} 30'$ .

**DARMSTAT**, the capital of Hesse-Darmstadt, in the circle of the upper Rhine in Germany, situated on a river of the same name, fourteen miles south of Francfort, and thirteen south-east of Mentz: east long.  $8^{\circ} 25'$ , and north lat.  $49^{\circ} 45'$ .

**DARNEL**, the english name of the lolium of botanists. See the article **LOLIUM**.

**DARREIN**, in law, a corruption of the french word *dernier*, last, is used in this sense in our law, as *darrein continuance*, &c.

**DARREIN PRESENTMENT**, the last presentation to a church, on which an assize lies. See *ASSIZE of darrein presentment*.

**DART**, in astronomy, geometry, &c. See the article **SAGITTA**.

**DART**, or sting of gnats. See **GNAT**.

**DARTFORD**, a market-town of Kent, in the Dover-road, fourteen miles south-east of London: east long.  $16'$ , and north lat.  $51^{\circ} 25'$ .

**DARTMOUTH**, a borough and port-town of Devonshire, situated on the english channel, twenty-six miles south of Exeter, which sends two members to parliament: west longitude  $4^{\circ}$ , and north lat.  $50^{\circ} 25'$ .

**DARWENT**, a river, which, rising in the Peak of Darbyshire, runs from north to south through that county, and falls into the Trent.

**DASYPUS**, in zoology, the same with armadillo. See **ARMADILLO**.

**DATA**, among mathematicians, a term for such things or quantities as are given or known, in order to find other things thereby that are unknown. Euclid uses the word data (of which he hath a particular tract) for such spaces, lines and angles as are given in magnitude, or to which we can assign others equal.

In algebra, the given quantities, or data, are expressed by the first letters of the alphabet, and the unknown quantities by the last letters; thus, if the problem be, from the sum and product of two quantities given, to find the quantities themselves, the quantities are represented by  $y$  and  $z$ ; and  $y + z = a$  the sum given, and  $yz = b$ , the product given. See the article **EQUATION**.

**DATA** also expresses, in philosophy and medicine, any quantity which for the sake of a present calculation is taken for granted to be such, without requiring an immediate proof for its certainty, called also the given quantity, number or power.

**DATE**, in law, is the description of the day, month, year of our Lord, and year of the reign of the king, in which a deed or other writing was made. Antiently deeds had no dates but only of the month and year, and now, if in the date of any deed, the year of our Lord is right, though the year of the king's reign be wrong, it shall not hurt the same. A deed is good, though it has no date of the day, or if that be mistaken, or though it contains an impossible date; but then he that pleads such a deed, must set forth the time when it was delivered: for every deed or writing has a date in law, and that is the

day of the delivery ; and where there is none, a plaintiff, it is said, may count it of any date.

In writings of importance, the date should be written in words at length.

In letters, it is usually written in figures.

An antedate is a date prior to the real time when the instrument was signed.

A post-date is that posterior to the real time when the instrument was passed.

**DATE**, *daitylus*, the fruit of the phoenix, or great palm-tree. See **PHOENIX**.

Dates are esteemed moderately strengthening and astringent, for which reason they are prescribed for diarrhoeas that are habitual, for weaknesses of the stomach, and for strengthening the womb ; but at present, we make little use of them in England. The best for medicinal purposes are those of Tunis, and the country thereabout, of Egypt and many parts of the east ; the dates of Spain, and the south of France, though they look well, being never perfectly ripe, and very subject to decay. They are to be chosen large, full, fresh, of a yellow colour on the surface, soft and tender, not too much wrinkled, and such as have the pulpy part either of a good white throughout, or else reddish toward the surface, and white toward the kernel. Dates the hundred weight pay 1l. 14s. 4  $\frac{2}{8}$  d. on importation ; and draw back on exportation 1l. 11s. 6d. They are preserved in three different ways ; some pressed and dry, others pressed more moderately ; but the best are those not pressed at all, only moistened with the juice of other dates, as they are packed up in baskets or in skins.

**DATE-PLUM**, in botany, a name used by some for the *diospyros*, a distinct genus of plants. See **DIOSPYROS**.

**DATISCA**, in botany, a genus of the *doccia-decandria* class of plants, the cup of which consists of five leaves : there are no flower-petals ; and its fruit is a triangular, unilocular capsule, containing a great number of seeds.

**DATISI**, in logic, a mode of syllogisms in the third figure, wherein the major is an universal affirmative, and the minor and conclusion particular affirmative propositions. For example,

PA- All who serve God are kings,

TI- Some who serve God are poor,

SI- Therefore some who are poor are kings.

**DATIVE**, among grammarians, the third case in the declension of nouns, expres-

sing the relation of a thing to whose profit or loss some other thing is referred. It is called dative, because usually governed by a verb, implying something to be given to some person. In english, the dative is expressed by the signs *to* or *for*.

**DATURA**, **THORN-APPLE**, in botany, a genus of the *pentandria-monogynia* class of plants : the flower consists of an infundibuliform petal ; the fruit is a subovated, bilocular, quadrilobular, and commonly prickly capsule, fixed to the base of the cup ; the seeds are numerous and reniform. See plate LXVII. fig. 2. The thorn-apple is narcotic, and dangerous to be taken internally ; but a cataplasm of its leaves and seed is commended for burns.

**DAUCUS**, the **CARROT**, in botany, a genus of plants belonging to the *pentandria digynia* class. The general flower is unequal : the proper one consists of five inflexo-cordated petals, the exterior ones being the largest. There is no pericarpium : the fruit is of an oval figure every way covered with rigid hairs, and is divisible into two parts : the seeds are two, of a suboval figure, convex and hairy on one side, and plain on the other. See plate LXVII. fig. 3.

There are two kinds of daucus-seeds kept in the shops, distinguished by the name of *daucus creticus*, and *daucus vulgaris*. The seeds of the *daucus creticus* come principally from Germany and the Levant : these seeds are to be chosen fresh, sound, and large, not dusty, and of an acrid taste. It is very apt to breed insects, and must, on that account, be carefully looked into, as it has no virtue when that is the case. The seeds of the cretic and common daucus have the same general virtues ; they are powerful diuretics, and much celebrated as carminatives and uterines : they attenuate thick and viscid humours, and promote the menses. Many people esteem the seed of the common daucus a remedy for the stone : the cretic kind is one of the four lesser hot seeds of the shops.

**DAVENTRY**, a market-town of Northamptonshire, situated about ten miles north of Northampton : west long. 1° 15', and north lat. 52° 12'.

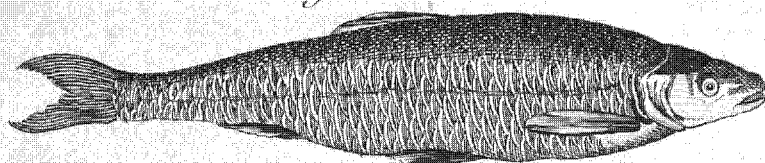
**DAUGHTER**, *filia*, a female child. See the article **CHILDREN**.

As they required greater expences to educate and settle them in the world, than sons, they were for that reason more frequently exposed by the antients.

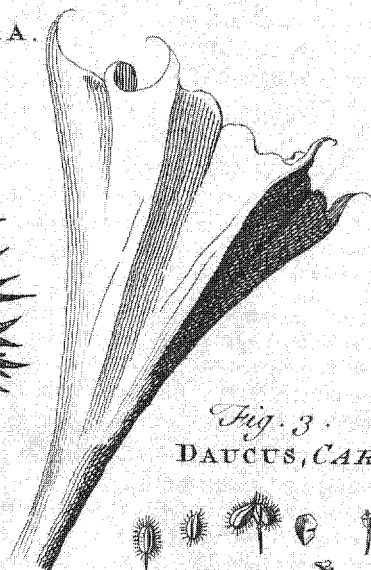
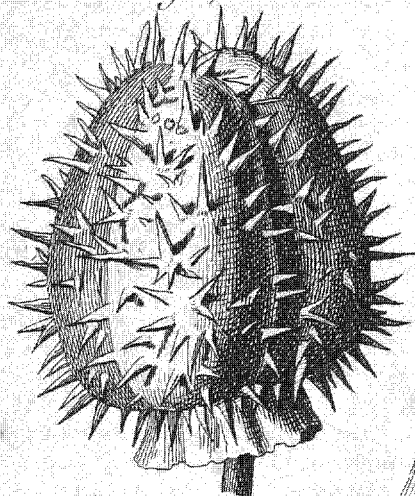
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*Fig. 1. DACE.*



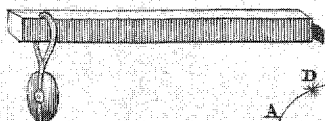
*Fig. 2. DATURA.*



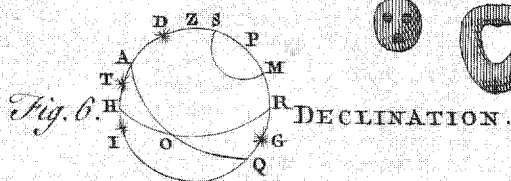
*Fig. 3.*  
DAUCUS, CARROT.



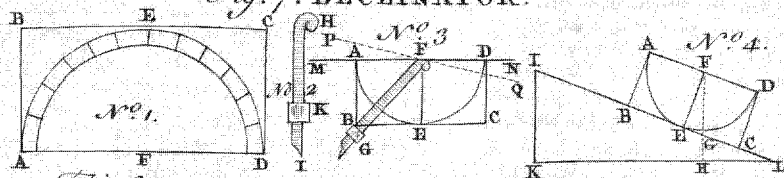
*Fig. 4. DAVIT.*



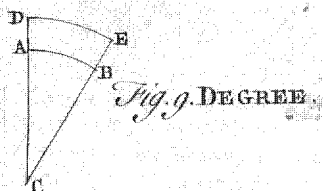
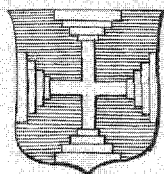
*Fig. 5. DEAD-EYES.*



*Fig. 7. DECLINATOR.*



*Fig. 8. DEGRADED.*



*Fig. 9. DEGREE.*

*J. Jefferys sculp.*



Those who had no legitimate sons, were obliged by the athenian laws, to leave their estates to their daughters, who were confined to marry their nearest relation, otherwise to forfeit their inheritance, as we find to have been practised among the Jews, many of whose laws seem to have been transcribed by Solon. And if an heiress happened to be married before her father's death, this did not hinder the nearest relation to claim the inheritance, and even to take the woman from her husband.

**DAUGHTER** of a voice, among the Jews. See the article **BATH-KOL**.

**DAVIDISTS**, in church history, a sect of christian heretics in the XVIIth century ; so called from David George, their leader, who began by giving out that he was the Messiah, and was sent into the world in order to people the kingdom of heaven, which was quite empty of inhabitants, for want of virtuous and good men : he rejected marriage, and denied the resurrection.

**DAVIDS**, or **ST. DAVID'S**, a city, and bishop's see, of Pembrokeshire, situated near the irish channel, about twenty miles north west of Pembroke : west long.  $5^{\circ} 26'$ , and north lat.  $52^{\circ}$ .

**ST. DAVID'S** is also the name of a town and fort situated on the coast of Coromandel, in the hither India, about eighty miles south of Fort Saint George : east long.  $79^{\circ} 40'$ , and north lat.  $11^{\circ} 45'$ .

**DAVIS'S STRAITS** run north west from Cape Farewell, in  $60^{\circ}$ , north lat. to Baffin's Bay, in  $80^{\circ}$  north lat. separating Greenland from North America.

**DAVIS'S QUADRANT**, the same with back-staff. See **QUADRANT** and **BACKSTAFF**.

**DAVIT**, in a ship, that short piece of timber with a notch at one end, wherein, by a strap, hangs the fish block. See plate **LXVII.** fig. 4.

The use of this block is to help up the fluke of the anchor, and to fasten it at the ship's bow, or loof. The davit is shiftable from one side of the ship to the other, as there is occasion.

There is also a small davit in the ship's boat, that is set over her head with a shiver, in which is brought the buoy-rope, wherewith to weigh the anchor ; it is made fast to the carlings in the boat's bow.

**DAUPHIN**, a title given to the eldest son of France, and heir presumptive of the crown, on account of the Province of Dauphiny, which, in 1343, was given to Philip of Valois, on this condition,

by Humbert, dauphin of the Viennois. The seigneurs, or lords of Auvergne, have likewise borne the appellation of dauphin, but the dauphins of Auvergne held it not till a good while after those of the Viennois, and even received it from them.

**DAUPHIN**, in the history of shell-fish, a species of cochlea, or snail, with a round mouth. See the article **COCHLEA**.

**DAUPHIN-FORT**, a fort built by the french, on the eastern coast of the island of Madagascar, east long.  $48^{\circ}$ , and south lat.  $24^{\circ}$ .

**DAUPHINE**, or **DAUPHINY**, a province of France, bounded by Burgundy on the north, by Piedmont on the east, by Provence on the south, and by the river Rhone, which separates it from Languedoc and the Lyonois, on the west.

**DAY**, according to the most natural and obvious sense of the word, signifies that space of time during which it continues to be light ; in contradistinction to night, being that partition of time wherein it is dark ; but the space of time in which it is light, being somewhat vague and indeterminate, the time between the rising and setting of the sun is usually looked on as the day ; and the time which lapses from its setting to its rising again, the night.

The word day is often taken in a larger sense, so as to include the night also ; or to denote the time of a whole apparent revolution of the sun round the earth, in which sense it is called by some a natural day, and by others an artificial one : but to avoid confusion, it is usual to call it in the former sense simply the day, and in the latter a nychthemeron, by which term that acception of it is aptly denoted, as it implies both day and night.

The nychthemeron is divided into twenty-four parts, called hours, which are of two sorts, equal and unequal, or temporary. See the article **HOURL**.

Different nations begin their day at a different hour : thus the Egyptians began their day at midnight, from whom Hippocrates introduced that way of reckoning into astronomy, and Copernicus and others have followed him : but the greatest part of astronomers reckon the day begun at noon, and so count twenty-four hours, till the noon of the next day ; and not twice twelve, according to the vulgar computation. The method of beginning the day at mid-

night prevails also in Great Britain, France, Spain, and most parts of Europe. The Babylonians began their day at sun-rising, reckoning the hour immediately before its rising again the twenty-fourth hour of the day, from whence the hours reckoned in this way are called the Babylonian. In several parts of Germany, they begin their day at sun-setting, and reckon on till it sets next day, calling that the twenty-fourth hour: these are generally termed Italian hours. The Jews also began their nychthemeron at sun-setting; but then they divided it into twice twelve hours, as we do, reckoning twelve for the day, be it long or short, and twelve for the night; so that their hours continually varying with the day and night, the hours of the day were longer than that of the night, for one half year, and the contrary the other; from whence their hours are called temporary: those, at the time of the equinoxes became equal, because then those of the day and night are so. The Romans also reckoned their hours after this manner, as do the Turks at this day. This kind of hours are called planetary, because the seven planets were antiently looked upon as presiding over the affairs of the world, and to take it by turns each of these hours, according to the following order: saturn first, then jupiter, mars, the sun, venus, mercury, and last of all the moon: hence they denominated each day of the week from that planet whose turn it was to preside the first hour of the nychthemeron. Thus assigning the first hour of Saturday to saturn, the second will fall to jupiter, the third to mars, and so the twenty-second of the same nychthemeron will fall to saturn again, and therefore the twenty-third to jupiter, and the last to mars: so that on the first hour of the next day, it will fall to the sun to preside; and by the like manner of reckoning, the first hour of the next will fall to the moon; of the next, to mars; of the next, to mercury; of the next, to venus: hence the days of the week came to be distinguished by the latin names of *dies saturni, solis, lune, martis, mercurii, jovis, and veneris*; and among us, by the names of Saturday, Sunday, Monday, &c.

**DAY**, in a legal sense, relates to the day of appearance of parties, or the continuance of suits, where a day is given, &c. See the article **ESSEIN**.

In real actions there are common days

and special days given by the judges, in an assize, &c.

**DAYS in bank**, are days set down by statute or order of the court, when writs shall be returned, or when the party shall appear on the writ served. They say also, if a person be dismissed without day, he is finally discharged.

**DAYS of grace**, are those granted by the court at the prayer of the defendant, or plaintiff, in whose delay it is.

**DAYS of grace**, in commerce, are a customary number of days allowed for the payment of a bill of exchange, &c. after the same becomes due.

Three days of grace are allowed in England; ten in France and Dantzic; eight at Naples; six at Venice, Amsterdam, Rotterdam, and Antwerp; four at Frankfurt; five at Leipzig; twelve at Hamburg; six in Portugal; fourteen in Spain; thirty in Genoa, &c.

**DAY-LIGHT**, in our law; some time after sun-setting, and before sun-rising, being accounted part of the day, when the hundred is liable for any robberies committed within that time.

**DAY'S MAN**, in the north of England, an arbitrator or person chosen to determine an affair in dispute.

**DAYS of prefixion** in the exchequer, see the article **REMEMBRANCER**.

**DOG-DAYS**, *dies caniculares*. See the article **CANICULAR DAYS**.

**Intercalary DAYS**. See the article **INTER-CALARY DAYS**.

**DAY-COAL**, among miners, an appellation given to the upper stratum of the coal, or that which lies next the surface of the earth. See the article **COAL**.

**DAZE**, among miners, denotes the same with the telaugia of naturalists. See the article **TELAUGIA**.

**DEACON**, *διακονος*, one of the three sacred orders of the christian church. The word is sometimes used in the New Testament for any one that ministers in the service of God, in which sense bishops and presbyters are stiled deacons; but in its restrained sense, it is taken for the third order of the clergy, as appears from the concurrent testimony of antient writers, who constantly stile them ministers of the mysteries of Christ, ministers of episcopacy and the church, and the like. The first institution of this order is recorded in Acts, ch. 6.

As to the office of deacons, the most common and ordinary was to be attendant on the bishops and presbyters in the service of the

the altar, to take care of the holy table and all the ornaments and utensils belonging to it, and, in the next place, to receive the offerings of the people, and to present them to the priest; at the same time reciting the names of those that offered. In some churches, tho' not in all, the deacons read the gospel both before and at the communion service; but their most peculiar office was to assist the bishop and presbyters in the administration of the eucharist, at which their business was to distribute the elements to the people who were present, and carry them to those who were absent. That they were never allowed to consecrate them at the altar, appears from the testimonies of Hilary, Jerom, and the author of the constitutions. They were permitted, however, to administer solely the sacrament of baptism in some cases. Another part of the office of deacons, was to be a sort of monitors and directors to the people in the exercise of their public devotions in the church; for which purpose they made use of certain known forms of words, to give notice when each part of the service began. Whence they are sometimes called *ιεροψήφους*, the holy cryers of the church. Deacons had, by licence and authority from the bishop, a power to preach, to reconcile penitents and grant them absolution, and to represent their bishops in general councils. Their office out of the church was to take care of the necessitous, such as orphans, widows, prisoners, and all the poor and sick who had any title to be maintained out of the public revenues of the church; to enquire into the morals and conversation of the people, and to make their report thereof to the bishop. Whence, on account of the variety of business, it was usual to have several deacons in the same church.

In the romish church, it is the deacons office to incense the officiating priest or prelate; to lay the corporal on the altar; to receive the paten or cup from the sub-deacon, and present them to the person officiating; to incense the choir; to receive the pax from the officiating prelate, and carry it to the sub-deacon; and at the pontifical mass, when the bishop gives the blessing, to put the mitre on his head, and to take off the archbishop's pall, and lay it on the altar. In England, the form of ordaining deacons, declares that it is their office to assist the priest in the distribution of the holy communion; in which,

agreeably to the practice of the antient church, they are confined to the administering the wine to the communicants. A deacon, with us, is not capable of any ecclesiastical promotion, yet he may be a chaplain to a family, curate to a beneficed clergyman, or lecturer to a parish church. He may be ordained at twenty-three years of age, *anno corrente*; but it is expressly provided, that the bishop shall not ordain the same person a priest and deacon in the same day. Deacons, according to St. Paul, should be chaste, sincere, and blameless; neither great drinkers, nor given to filthy lucre; they should hold the mystery of the faith in a pure conscience, and should be well approved before they are admitted to the ministry.

**DEACONESS**, a female deacon, an order of women, who had their distinct offices and services in the primitive church. This office appears as antient as the apostolical age; for St. Paul calls Phoebe a servant of the church of Cenchrea. The original word is *διακονος*, answerable to the latin word *ministra*. Tertullian calls them *viduæ*, widows, because they were commonly chosen out of the widows of the church; and, for the same reason Epiphanius, and the council of Laodicea, calls them *πρεσβυτιδας*, elderly women, because none but such were ordinarily taken into this office. For, indeed, by some antient laws, these four qualifications were required in every one that was to be admitted into this order. 1. That she should be a widow. 2. That she should be a widow that had born children. 3. A widow that was but once married. 4. One of a considerable age, forty, fifty, or sixty years old. Tho' all these rules admitted of exceptions. Concerning their ordination, whether it was always performed by imposition of hands, the learned are much divided in their sentiments. Baronius and Valefius think they were not, and make no other account of them than as mere lay-persons. But the author of the constitutions, speaking of their ordination, requires the bishop to use imposition of hands, with a form of prayer which is there recited. We are not, however, to imagine, that this ordination gave them any power to execute any part of the sacerdotal office. They were only to perform some inferior services of the church, and those chiefly relating to the women for whose sakes they were ordained. One part of their office was to assist the minister at the

the baptizing of women, to undress them for immersion, and to dress them again, that the whole ceremony might be performed with all the decency becoming to sacred an action. Another part of their office was to be private catechists to the women-catechumens who were preparing for baptism. They were likewise to visit and attend women that were sick and in distress; to minister to the martyrs and confessors in prison; to attend the women's gate in the church; and, lastly, to assign all women their places in the church, regulate their behaviour, and preside over the rest of the widows, whence in some canons they are styled *πρωτοκλήρικαι*, governesses. This order, which since the tenth or eleventh century has been wholly laid aside, was not abolished every where at once, but continued in the greek church longer than in the latin, and in some of the latin churches longer than in others.

**DEACONRY**, the order or ministry of a deacon or deaconess. See **DEACON**, &c.

**DEACONRY**, *diaconia*, is also the name of the chapels and oratories in Rome, under the direction of the several cardinal deacons in their respective quarters. Antiently they were seven in number, as the deaconry of St. Maria in the broad way, the deaconry of St. Eustachio near the Pantheon, &c. answering to the seven regions of the city. They had hospitals annexed to them for the distribution of alms, and an administrator for temporal concerns, called the father of the deaconry, who was sometimes a priest and sometimes a layman. At present, there are fourteen of these deaconries, or hospitals, under the direction of as many cardinals.

**DEAD**, in general, something void or deprived of life. See **DEATH**.

**DEAD-MAN'S HEAD**, in geography, a cape or promontory near Tregony in Cornwall, between St. Mawes and Fowey.

**DEAD-MENS-EYES**, in the sea-language, a kind of blocks with many holes in them, but no sheevers, whereby the shrouds are fastened to the chains: the crow-feet reeve also through these holes; and, in some ships, the main-stays are set taught in them; but then they have only one hole, thro' which the lanyards are passed several times. See plate LXVII. fig. 5.

**DEAD-NETTLE**, a genus of plants called by botanists *lamium*. See **LAMIUM**.

**DEAD-PLEDGE**, the same with mortgage. See the article **MORTGAGE**.

**DEAD-RECKONING**, in navigation, the calculation made of a ship's place by means of the compass and log; the first serving to point out the course she sails on, and the other the distance run. From these two things given, the skilful mariner, making proper allowances for the variation of the compass, lee-way, currents, &c. is enabled, without any observations of the sun or stars, to ascertain the ship's place tolerably well. See the articles **COURSE**, **SAILING**, **COMPASS**, **CURRENT**, **LEE-WAY**, &c.

**DEAD-RISING**, among sailors, that part of a ship which lies aft, between the keel and the floor-timbers, next adjoining to the stern-post, under the bread-room in a ship of war.

**DEAD-ROPEs**, on board a ship, such ropes as do not run in any block.

**DEAD-SEA**, in geography, a lake of Judea, into which the river Jordan discharges itself; being about seventy miles long, and twenty broad.

The water of this lake is both salt, and nauseously bitter; and the bitumen it affords exactly resembles pitch, from which it can only be distinguished by its sulphureous smell and taste.

**DEAD-TOPs**, a disease incident to young trees, and cured by cutting off the dead parts close to the next good twig or shoot, and claying them over as in grafting. See the article **GRAFTING**.

**DEAD-WATER**, at sea; the eddy-water just astern of a ship, so called, because it does not pass away so swift, as the water running by her sides does. They say, that a ship makes much dead water, when she has a great eddy following her stern.

**DEADLY FEUD**, in law, a profession of an irreconcilable hatred, till a person is revenged even by the death of his adversary. This enmity was allowed in the old saxon laws: for where any person was killed, if a pecuniary satisfaction was not made to the kindred of the slain, it was lawful for them to revenge themselves, by arms, on the murderer. See **FEUD**.

**DEADLY-CARROT**, a plant called by botanists *thapsia*. See **THAPSIA**.

**DEADLY-NIGHTSHADE**, a name given to the belladonna of botanists. See the article **BELLADONNA**.

**DEADS**, among miners, denotes the earth or other fossil substances which inclose the ore on every side. Hence, *breaking up the deads*, is the removing these substances for the conveniency of carrying on their work.

**DEAF-**

**DEAFFORESTED**, a term found in law-books, signifying that a place is discharged from being a forest, or freed from the forest-laws.

**DEAFNESS**, the state of a person who either wants the sense of hearing, or has it greatly impaired.

The causes of deafness are a cutting off the external ear, or an obstruction of the auditory passage, from wax, or other things; from a rupture of the membrane of the tympanum; or when it is corroded, or ulcerated, or the auditory nerve is obstructed or compressed. External causes, are falls from high places; excessive noise, such as the explosion of cannon; likewise acute diseases near their state, which are like to terminate by a critical hæmorrhage.

As to the prognostics, those who are born deaf are rarely cured. A real deafness is hard to remedy. A deafness in acute diseases, with crude urine, foretells a delirium: but when the signs of coction are good, it portends a critical hæmorrhage.

With regard to the cure, if the obstruction be in the external cavity of the ear, it is discernible by the sight. If there is occasion to syringe the ear, a decoction of sage and rosemary-flowers will be proper, with equal parts of water and white-wine: but great caution should be used. Some pump the head with warm-bath waters: some say, the eggs of ants bruised, and put into the ear, with the juice of an onion, cures the most inveterate deafness. Others affirm, that a salivation will sometimes perform a cure. A critical deafness will cease of itself. Etmuller recommends amber and musk; and hardness of hearing has been often cured by putting a grain or two of musk into the ear with cotton.

Hoffman says, deafness sometimes arises from a slackness of the auditory nerves, which often happens from too great a humidity, which, if neglected, will terminate in a perpetual and incurable deafness, and may be dispersed, if taken in time, by proper cephalics and sudorifics. Some, for this purpose, recommend equal parts of spirit of lavender and hungary-water, which should be dropt warm into the ear. Lindanus advises the gall of an eel, mixt with spirit of wine; and others, the fumes of sulphur conveyed into the ear with a pipe or funnel: but regard must always be had to the cause, if discoverable.

Heister informs us, that medicinal waters drank in the summer time pretty largely, are the best means as preservatives, and for curing disorders of the ears; and that they often perform more than any other remedies whatever.

Those born deaf are also dumb, as not being able to learn any language, at least in the common way: however, as the eyes, in some measure, serve them for ears, they may sometimes understand what is said, by observing the motion of the lips, tongue, &c. of the speaker.

**DEAL**, a thin kind of fir-planks, of great use in carpentry: they are formed by sawing the trunk of a tree into a great many longitudinal divisions, of more or less thickness, according to the purposes they are intended to serve.

Deals are rendered much harder, by throwing them into salt-water as soon as they are sawed, keeping them there three or four days, and afterwards drying them in the air or sun; but neither this nor any other method yet known, will preserve them from shrinking.

Deals called Burgendorp deals, the hundred containing six score, pay on importation 3l. 3s. 8 $\frac{4}{10}$ d. and draw back 3l. 3s. the rate 12l. Meabro deals, six score, pay 1l. 2s. 10 $\frac{8}{10}$ d. and draw back 1l. 1s. the rate 4l. Norway deals, six score, pay 1l. 8s. 7 $\frac{1}{2}$ d. and draw back 1l. 6s. 3d. the rate 5l. Spruce deals, six score, pay 4l. 5s. 10 $\frac{1}{2}$ d. and draw back 3l. 18s. 9d. the rate 15l. Deals from Russia, and all other countries not particularly rated, exceeding twenty foot in length, pay 4l. 5s. 10 $\frac{5}{10}$ d. and draw back 3l. 18s. 9d. the rate 15l. Deals from Sweden, or any other country, of twenty feet in length or under, not otherwise rated, the 120, pay 1l. 8s. 7 $\frac{1}{2}$ d. and draw back 1l. 6s. 3d. the rate 5l.

**DEAL**, in geography, a port-town of the county of Kent, between which and the Goodwin-sands, the shipping usually rides in the Downs, in going out or coming home: it is about sixty-seven miles eastward of London: east long. 1° 30', and north lat. 51° 16'.

**DEAN**, an ecclesiastical dignitary in cathedral and collegiate churches, and head of the chapter.

As there are two foundations of cathedral churches in England, the old and the new, so there are two ways of creating deans. Those of the old foundation, founded before the suppression of monasteries,

monasteries, as the deans of St. Paul's, York, &c. are raised to that dignity much after the manner of bishops, the king first sending his *congé d'elire*, the chapter electing, and the king granting his royal assent, the bishop confirms him, and gives his mandate to install him. Those of the new foundation, whose deaneries were raised upon the ruins of priories and convents, such as the deans of Canterbury, Durham, Ely, Norwich, Winchester, &c. are donative, and installed by virtue of the king's letters patent, without either election or confirmation. Canonists distinguish between deans of cathedral and those of collegiate churches. The first, with their chapter, are regularly subject to the jurisdiction of the bishop. As to the latter, they have usually the contentious jurisdiction in themselves, though sometimes this belongs to them in common with the chapter. There are cathedral churches which never had a dean, and in which the bishop is head of the chapter, and in his absence, the archdeacon: such are the cathedrals of St. David and Landaff. There are also deans without a chapter, as the dean of Battle in Sussex, dean of the arches, &c. and deans without a jurisdiction, as the dean of the chapel royal. In this sense the word is applied to the chief of certain peculiar churches or chapels.

**Rural DEAN**, called also archpresbyter, originally exercised jurisdiction over ten churches in the country, and afterwards became only the bishop's substitute, to grant letters of administration, probate of wills, &c. to convocate the clergy, and signify to them sometimes by letters, the bishop's will, and to give induction for the archdeacon. Their office is now lost in that of the archdeacons and chancellors.

**DEAN of a monastery**, was a superior established under the abbot, to ease him in taking care of ten monks, whence he was called *decanus*.

**DEAN and CHAPTER**, are the bishop's council to assist him in the affairs of religion, and to assent to every grant which the bishop shall make to bind his successors. As a deanry is a spiritual dignity, a man cannot be a dean and prebendary of the same church.

**DEAN**, in geography, the name of a forest in Gloucestershire, lying northward of the river Severn.

**DEARTICULATION**, the same with diarthrosis. See **DIARTHROSIS**.

**DEATH**, *mors*, is generally considered as the separation of the soul from the body; in which sense it stands opposed to life, which consists in the union thereof. Physicians teach, that as the life of those animals we call perfect consists in a continued flux and reflux of the blood, nervous juice and air, to and from the principal organs, so a man may be reckoned dead when he no longer breathes, and his heart and arteries have left off all circulation and pulsation. But Dr. Stevens, as we find in the Medical Essays, does not admit this doctrine, being of opinion, that after the motion of the heart, arteries, and lungs ceases, there often remains a small degree of vital principle deserving attention. He then proposes a theory of his own, in consequence of which it seems, that death does not inevitably attend an intire organic rest of what we call the solids of the body; nay, that one cannot be called dead, till the energy of the blood is so far gone, that, though assisted by all possible means, it can never be again able to fill and stimulate into contraction the right sinus venosus, and auricle of the heart.

Men, says lord Bacon, fear death as children fear the dark; and as that natural fear in children is increased by frightful tales, so is the other. Groans, convulsions, weeping friends and the like, shew death terrible; yet there is no passion so weak but conquers the fear of it, and therefore death is not such a terrible enemy. Revenge triumphs over death, love slights it, honour aspires to it, dread of shame prefers it, grief flies to it, and fear anticipates it. The same noble author thinks it the office of a physician to procure easy deaths, as well as to restore health.

In law, there is a natural death and a civil death: natural, where nature itself expires; civil, where a person is not actually dead, but adjudged so by law. Thus, if any person, for whose life an estate is granted, remains beyond sea, or is otherwise absent seven years, and no proof made of his being living, he shall be accounted naturally dead.

**DEATH-WATCH**, in zoology, an insect nearly of the size of the common louse, frequent among old wood, furniture, &c. It is of an oblong and flattish figure, and of a pale brownish-white colour; and the noise,



noise, resembling the beating of a watch; is the love-note of these animals, when the male or female woo each other.

**DEAURATA**, in ichthyology, a fish of the cyprinus kind, with forty rays in the fin near the anus. See **CYPRINUS**.

**DE BENE ESSE'**, a latin phrase used in our law in a doubtful meaning, as to take or do a thing *de bene esse*, is to allow it at present to be well done; but when it comes to be more fully examined, then to stand or fall according to the merit of the thing. In the chancery, upon a motion for one of the defendants of a suit to be examined, the court frequently orders it to be done *de bene esse*, viz. that his deposition shall be taken, and allowed or suppressed at the hearing of the cause upon the full debate of the matter as the court shall think fit. Also where a complainant's witnesses are sick or aged, or going beyond sea, so that he is in danger of losing their evidence, the court of chancery will order them to be examined *de bene esse*, in which case they are valid, if the plaintiff has not an opportunity of examining them afterwards.

**DEBENHAM**, a market-town of Suffolk, about twenty miles east of Bury: east long. 1° 20', and north lat. 53° 26'.

**DEBENTURE**, a term of trade used at the custom-house for a kind of certificate signed by the officers of the customs, which intitles a merchant exporting goods to the receipt of a bounty or drawback. All merchandises that are designed to be taken on board for that voyage being entered and shipped, and the ship being regularly cleared out, and sailed out of port on her intended voyage, debentures may be made out from the exporter's entries, in order to obtain the drawbacks, allowances, bounties or premiums; which debentures for foreign goods, are to be paid within one month after demand. And in making out these debentures, it must be observed, that every piece of vellum, parchment, or paper, containing any debenture for drawing back customs or duties, must, before writing, be stamped, and pay a duty of eight-pence.

The forms of debentures vary, according to the merchandise exported. In the execution of debentures for tobacco, it must be particularly observed, 1. That debentures for the same quantity, may be made in one or more parchments. 2. That the exporter's oath must be printed, specifying whether he acts for himself or by commission. If exported to any other

foreign ports than Ireland, the word Ireland must be added to the oath after Great Britain. 4. That as no tobacco may be consumed on board ships of war in Europe, but what has paid full duties, and been manufactured in Great Britain, no drawback is to be allowed for tobacco exported in any man of war.

5. That the eight pounds *per* hoghead of 350 pounds, or more, allowed for draught at importation, must not be deducted on exportation. 6. That debentures for tobacco exported to Ireland, must not be paid till a certificate be produced, testifying the landing thereof. 7. That no persons may swear to the exportation, but such as are permitted to swear to debentures for other goods. In debentures for all other foreign goods, no person may be admitted to swear to the exportation, but the true exporter, either as a proprietor, or, who being employed by commission, is concerned in the direction of the voyage. All kinds of debentures before delivered or paid to the exporters, are entered into a separate book kept for that purpose by the collector and comptroller of the customs. See **BOUNTY**.

**DEBENTURE**, in some of the acts of parliament, denotes a kind of bond or bill first given in 1649, whereby the government is charged to pay the soldier creditor, or his assigns, the money due on auditing the account of his arrears.

**DEBENTURE** is likewise used in the exchequer, and given to the king's servants for the payment of their wages.

**DEBET**, among merchants, signifies the sums due to them for goods sold on credit, for which they have charged their journal or ledger. It is more particularly understood of the remainder of debts, part of which has been paid on account.

**DEBET**, among book-keepers, is used to express the left-hand page of the ledger, to which are carried all articles supplied or paid, on the subject of an account.

**DEBET** and **SOLET**, in law, are formal words used in divers writs, sometimes both together, and sometimes only *debet*. As if a person by writ sues to recover any right whereof his ancestor was disseized, then he uses the word *debet* alone: but where he sues for any thing that is now first of all denied him, in that case he uses *debet* and *solet*.

**DEBET & DETINET**, *he owes and detains*, in law, are terms used in bringing of actions. Debt against an heir, must be in the *debet* and *detinet*; but against

executors, for money due in the time of the testator, the action ought to be in the detinet.

**DEBILITY**, among physicians, a relaxation of the solids, occasioning oftentimes weakneses and faintings.

**DEBRECHEN**, a town of upper Hungary, about seventy-seven miles east of Buda: east lon.  $21^{\circ} 10'$ , and north lat.  $47^{\circ} 45'$ .

**DEBRUIZED**, in heraldry, a term peculiar to the English, by which is intimated the grievous restraint of any animal, debarred of its natural freedom, by any of the ordinaries being laid over it.

**DEBT**, *debitum*, in law, any thing due to another, whether it be money, goods, or services; or, the action brought for recovering the same.

Where money is due upon any speciality, an action of debt, and no other, lies. On a bond, debt may be brought against the obligor or his heir, who has lands by descent, if the executors have not sufficient to pay it; and an heir mediate may be sued for debt, as if he were an immediate heir. If a person acknowledges, by deed, that he has so much of another's money in his hands, here the action of debt will lie for it; and where one owes a sum of money to another, who hath his note under hand, without a seal, action of debt on a mutuatus lies. Debt lies also on a recognizance; so upon a statute merchant, which is in nature of a bond, or obligation; but it is said to be otherwise, in case of a statute staple.

Whether an action of debt be brought on a bill, bond, lease, &c. the several writings are to be well considered, by which the plaintiff warrants his action, and the sum due must be rightly set forth: thus, if it be for rent, the time of commencement and ending must be specified; and the judgment, where the demand is in the detet and detinet, is to recover the debt, damages, and costs of suit. But in a debt on a single bill, a defendant may plead payment, before the action brought in bar; and, on bond, he may bring in the principal, interest, and costs pending the action, and thereupon be discharged.

**DEBT to the king**, comprehends in it all rents, issues, amerciaments, and other things due to the king, whose debts are preferred before those of a subject; and until his debt is satisfied, he may protect the debtor from the arrests of others. Pledges shall not be distrained for these debts, where the principal is sufficient.

**DEBTOR**, a person who owes any thing to another, in contradistinction to creditor, which is he to whom the debt is owing.

Where debt is a simple contract, it follows the person of the debtor, and, it is said, not of the creditor, as to actions brought, &c.

There have been divers statutes discharging debtors out of prison, when they had no effects to pay their creditors. See the article PRISONER.

**DEBTOR**, in merchants accounts. See the article BOOK-KEEPING.

**DECACHORDON**, in antiquity, a musical instrument with ten strings, called by the Hebrews hafur, being almost the same as our harp, of a triangular figure, with an hollow belly, and sounding from the lower part.

**DECACTIS**, a species of star-fish, with ten rays. See the article STAR-FISH.

**DECAGON**, in geometry, a plane figure with ten sides and ten angles: it is called a regular decagon, when all the sides and angles are equal.

If we suppose the radius of a circle to be

$$r, \text{ then will } \sqrt{\frac{5}{4}r^2 - \frac{1}{2}r}, \text{ or } \sqrt{\frac{5-1}{2}} + r,$$

be the side of a decagon inscribed in that circle. Again, supposing the side of a decagon to be 1, the area thereof will be 3.69; whence as 1 to 3.69, so is the square of the side of any given decagon to the area of that decagon.

**DECALITRON**, in antiquity, a coin equivalent to  $10 \frac{2}{3}$  attic oboli. See OBOLUS.

**DECALOGUE**, *δεκαλογος*, the ten precepts or commandments delivered by God to Moses, after engraving them on two tables of stone.

There are several refined speculations concerning the promulgation of those divine laws, as whether they were delivered by an angel, deputed by God for that purpose, or by the deity himself; and, if by the latter, whether it was the first or second person of the godhead that took upon him to be the legislator of the Jews: but these are debates of such a nature, that nothing can be concluded about them. The Jews, by way of excellence, call these commandments the *ten words*, from whence they had afterwards the name of decalogue: but it is to be observed, that they joined the first and second into one, and divided the last into two: they understand that against stealing, to relate to the stealing of men, or kidnapping;

kidnapping; alleging, that the stealing one anothers goods or property, is forbidden in the last commandment.

The Talmudists, and after them Pottellus, pretended that the decalogue was written, or engraved, in letters of light, *i. e.* luminous, shining letters, and that the engraving went quite thro' the tables. The emperor Julian objected to the decalogue, that the precepts it contained (those only excepted which concern the worship of false gods, and the observation of the sabbath) were already so familiar to all nations, and so universally received, that they were unworthy, for that very reason, to be delivered, by so great a legislator, to so peculiar a people. The church of Rome has struck the second commandment quite out of the decalogue, and to make their number complete, hath split the tenth into two. The reason of which may be easily conceived.

**DECAMERIS**, a term used by some writers upon sound, to denote a tenth part. See the article **SOUND**.

**DECAMPING**, in military affairs, is the marching of an army from the ground where it before lay encamped. See **CAMP**.

**DECAN**, a province of the hither India, bounded by the province of Cambaya, or Guzurat, on the north; by Golconda and Berar, on the east; by Visapour, on the south; and by the indian ocean on the west. Its chief inland town is Aurenghabad, and upon the coast the town of Bombay.

**DECANDRIA**, in the linnæan system of botany, a class of plants, the great characteristic of which is, that they have hermaphrodite flowers, with ten stamina in each. See **BOTANY**, **STAMINA**, &c.

**DECANTATION**, among chemists, &c. the gently pouring off a liquor from its fæces, by inclining the lip or canthus of the vessel; whence the name.

The design of this operation, is in order to have the liquor free from the sediment, which, upon standing, it lets fall to the bottom of the vessel.

**DECANUS**, in roman antiquity, an officer who preceded over ten other officers, and was head of the contubernium, or serjeant of a file of soldiers.

**DECAPITE'**, or **DEFFAIT**, in heraldry. See the article **DEFFAIT**.

**DECAPROTI**, *decemprimi*, in roman antiquity, officers for gathering the tributes and taxes.

The decaproti were also obliged to pay for the dead, or to answer to the empe-

ror for the quota parts of such as died, out of their own estates.

**DECASTYLE**, in the antient architecture, a building with an ordonnance of ten columns in front, as the temple of Jupiter Olympius was.

**DECEIT**, *dolus*, in law, a subtle trick, or device, to which may be added all manner of craft and collusion, or underhand practice, used to defraud another, by any means whatever.

Deceit is an offence both by common law and by statute. All practices of defrauding, or endeavouring to defraud, another of his right, are punishable by fine and imprisonment, and sometimes pillory, &c. and there is a writ called *deceptione*, that lies for one who receives injury or damage, &c.

A writ of deceit lies against attornies, for losses sustained by their default; also against bakers, brewers, and other artificers, for not selling good commodities, or refusing to perform a bargain: in all which cases, they are, by statute, liable to penalties in proportion to their offence.

**DECEIVED**, in the manege: a horse is said to be deceived, upon a demivault of one or two treads, when working, for instance, to the right, and not having yet finished above half the demivault, he is pressed one time or motion forwards, with the inner leg, and then is put to a reprite upon the left, in the same cadence with which he began; and thus he regains the place where the demivault had been begun to the right, and works to the left: thus a horse may be deceived upon any hand.

**DECEMBER**, in chronology, the last month of the year, consisting of thirty-one days, and so called as being the tenth month in the roman year, which commenced with march. See the articles **YEAR** and **MONTH**.

**DECEMPEDA**, *decempus*, in antiquity, a rule or rod divided into ten feet, each of which was subdivided into inches, and those into digits, used in measuring of land, and, by architects, in giving the proper dimensions and proportions to the parts of their buildings.

**DECEM TALES**, in law, a writ that issues directed to the sheriff, whereby he is commanded to make a supply of jurymen, where a full jury does not appear on a trial at bar.

**DECEMVIRI**, in roman antiquity, ten magistrates chosen annually at Rome, to govern the commonwealth instead of consuls,

fuls, with an absolute power to draw up and make laws for the people.

One of the decemviri had all the ensigns and honours of the function, and the rest had the like in their turn, during the year of their decemvirate. In them was vested all the legislative authority ever enjoyed by the kings, or, after them, by the consuls. It was the decemviri drew up the laws of the Twelve Tables, thence called *leges decemvirales*, which were the whole of the roman law, for a considerable time.

There were also other decemviri, created on frequent emergencies, to manage and regulate certain affairs, as conducting colonies, presiding at feasts, taking care of sacrifices, keeping the sibyls books, &c.

**DECENNALIA**, antient roman festivals celebrated by the emperors, every tenth year of their reign, with sacrifices, games, and largesses for the people. The emperor Augustus first instituted these solemnities, in which he was imitated by his successors: at the same time the people offered up vows for the emperor, and for the perpetuity of the empire, which were therefore called *vota decennialia*. Augustus's view in establishing the decennalia was to preserve the empire and the sovereign power without offence or restraint to the people.

**DECENNARY**, in our old law-books, denotes the precinct or district of ten fuburghs. See the next article.

**DECENNIERS, DECINERS, or DOZINNERS**, in our antient law, such as had the oversight of ten fuburghs, for the maintenance of the king's peace, the limits of whose jurisdiction was called decenna.

These seem to have had a great authority in the time of the Saxons, taking cognizance of causes within their circuits, and redressing wrongs, by way of judgment. In later times, the word came to signify such a person as by oath of loyalty to his prince, was settled in the combination or society of such a dozen.

**DECEPTIONE**, in law, a writ which lies in cases of deceit. See **DECEIT**.

**DECIDUOUS**, an appellation chiefly used in respect to plants: thus, the calyx or cup of a flower is said to be deciduous, when it falls along with the flower-petals; and, on the contrary, it is called permanent, when it remains after they are fallen. Again, deciduous leaves are those which fall in autumn, in contradistinction to those of the ever-greens, which remain all the winter.

**DECIES TANTUM**, in law, a writ that lies against a juror, for having taken money of either party in a suit, on account of giving his verdict.

This writ is so called because it recovers ten times as much as he took. Any person, though not a party in the suit, may bring this writ in the name of the king and himself, and recover the like; one half to the crown, and the other to the informer or prosecutor, which action the king may not release by pardon, after it is commenced.

**DECIL**, in astronomy, an aspect or position of two planets, when they are distant from each other a tenth part of the zodiac.

**DECIMÆ, TITHES**. See **TITHES**.

**DECIMAL ARITHMETIC**, the art of computing by decimal fractions.

**DECIMAL FRACTION**, that whose denominator is always 1, with one or more cyphers: thus, an unit may be imagined to be equally divided into 10 parts, and each of these into 10 more; so that by a continual decimal subdivision the unit may be supposed to be divided into 10, 100, 1000, &c. equal parts, called tenth, hundredth, thousandth parts of an unit. In decimal fractions, the figures of the numerator are only expressed, the denominator being omitted, because it is known to be always an unit with so many cyphers as there are places in the numerator. A decimal fraction is distinguished from an integer with a point prefixed, as .2 for  $\frac{2}{10}$ , .34 for  $\frac{34}{100}$ , .567 for  $\frac{567}{1000}$ , &c. The same is observed in mixed numbers, as 678.9 for  $678\frac{9}{10}$ , 67.89 for  $67\frac{89}{100}$ , 6.789 for  $6\frac{789}{1000}$ , &c.

Cyphers at the right hand of a decimal fraction alter not its value; for .5 or .50 or .5000 is each of them of the same value, equal to  $\frac{5}{10}$ , or  $\frac{1}{2}$ : but cyphers at the left hand, in a decimal fraction, decrease the value in a tenfold proportion; for .05 is  $\frac{5}{100}$ , .005 is  $\frac{5}{1000}$ , .0005 is  $\frac{5}{10000}$ , &c.

Decimal fractions are easily reduced into a common denominator, by making, or even supposing, all of them to consist of the same number of places; so .3, .45, .067, .0089, may be written thus, .3000, .4500, .0670, .0089; all which consisting of four places, their common denominator is an unit with four cyphers, namely 10000.

Addition and subtraction of decimals are the same as in whole numbers, when the places of the same denomination are set under

under one another, as in the following examples:

To	34.25	From	16.5
Add	3.026	Subtract	.125
Sum	37.276	Rem.	16.375

In multiplication the work is the same as in whole numbers, only in the product, separate, with a point, so many figures to the right hand as there are fractional places both in the multiplicand and multiplier; then all the figures on the left hand of the point make the whole number, and those on the right a decimal fraction. It is to be noted, that if there be not so many figures in the product, as ought to be separated by the preceding rule, then place cyphers at the left, to complete the number, as may be seen in Example V.

Ex. I. Mult.	456	Ex. II. Mult.	45.6
by	21.3	by	21.3
	1368		Product 971.28

Product 9712.8

Exam. III. Multiply	456
by	0.213
	97.128

Example IV. Multiply	45.6
by	0.213
Product	9.7128

Ex. V. Multiply	0.0456
by	0.213
Product	0.0097128

In division the work is the same as in whole numbers, only in the quotient, separate, with a point, so many figures to the right hand for a decimal fraction, as there are fractional places in the dividend, more than in the divisor, because there must be so many fractional places in the divisor and quotient together, as there are in the dividend.

As division of decimal fractions is extremely difficult, especially with regard to the value of the figures of the quotient, we shall here give a general rule for ascertaining their values, *viz.*

Rule, Place the first multiple of the divisor under the dividend, as in operations of common division; then will the unit's place of this multiple stand under such a place of the dividend, as the first significant figure of the quotient is to be; that is, the first significant figure of the quotient will be of the same name, or value, with the figure of the dividend which stands above the unit's place of the multiple.

This rule will hold in all cases. 1. When the number of decimals are equal in the divisor and dividend, the quotient will be integers, or whole numbers: for placing the first multiple of the divi-

Example I. for under the dividend, according to the rule, 8.45)295.75(35 (Exam. I.) the unit's place 5, is found to stand under 9, the place of tens in the dividend; so that 3, the first figure of the quotient, must be tens also, and 5, the next figure, units. 2. When the number of decimals in the dividend, exceed those in the divisor, as in Ex-

Example II. where 2, the unit's place of the multiple of the divisor, stands under 8, the place of tens of the dividend; whence 3, the first figure of the quotient, must be tens also; and 2, the next figure, units; so that the remaining figures, 12, must be decimals. This is done, more shortly, by making as many figures of the quotient decimals, as there are more decimal places in the dividend than in the divisor. 3. When there are not so many decimal places in the dividend, as there are in the divisor, cyphers must be added to the right hand of the dividend, to make them equal: thus, to divide 192.1 by 7.684,

Example III. as in Example III. add two cyphers, to make the decimals equal; and, by the above rule, the quotient 25 will be found to be integers, as 5,

the place of units, stands under 9, the place of tens. 4. If after division there are not so many figures in the quotient as there ought to be decimal parts, supply this defect by prefixing cyphers to the quotient found: thus, in Example IV.

Example IV. the quotient by division is found to be 758; and, by the above rule, the first figure, 7,

ought to stand in the decimal place of thousandths, which it is made to do by prefixing two cyphers.

Vulgar fractions are reduced to decimals of the same value, by dividing the numerator by the denominator.

Thus,  $\frac{1}{2} = \frac{1.0}{2} = .5$ , and  $\frac{3}{4} = \frac{3.00}{4} = .75$ , and

and  $\frac{2}{7} = \frac{2.000000, \&c.}{7} = .285714$ , nearly.

**DECIMAL SCALES** are those which are decimally divided. See **DECIMAL**.

**DECIMATION**, a punishment inflicted by the Romans on such soldiers as quitted their post, or behaved themselves cowardly in the field. The names of all the guilty were put into an urn or helmet, and as many were drawn out as made the tenth part of the whole number, and these were put to the sword, and the others saved.

**DECIPHERING**, the art of finding the alphabet of a cipher. See **CIPHER**.

Every language has, besides the form of its characters, something peculiar in the place, order, combination, frequency, and number of the letters; to all which particular regard is to be had in deciphering. In all languages, however, the following rules ought to be observed: 1. One word is to be compared with another, that their resemblance and difference may be known. 2. No word can be without a vowel. 3. A word of one letter is always a vowel, or a consonant with an apostrophe. 4. The vowels recur much more frequently than the consonants. 5. Double vowels may be at the beginning of a word, but not double consonants. 6. Double characters at the beginning of a word are always vowels. 7. Short words of two or three letters have two or three, or one or two consonants. 8. The vowels are therefore most easily learned from the short words which are to first considered by the decipherer. 9. If double characters are preceded by a single letter, the letter is a vowel. 10. In languages abounding with diphthongs one vowel is often joined with another. 11. The letter that precedes or follows double consonants is, if a consonant, always one of the liquids, *l, m, n, r*. 12. If two different characters occur, of which the latter is often conjoined with various letters, and the former is never found either by itself, or followed by any other letter, those two are *qu*. 13. These letters *qu* are always followed by a vowel. 14. One vowel recurs more frequently than another, as do the consonants, according to the language, &c.

**DECISE**, a town of the Orleanois, in France, situated on the river Loire, about fifteen miles south-east of Nevers: east lon.  $3^{\circ} 32'$ , and north latitude  $46^{\circ} 40'$ .

**DECK** of a ship is a planked floor from stem to stern, upon which the guns lie,

and where the men walk to and fro.

Great ships have three decks, first, second, and third, beginning to count from the lowermost.

Half deck reaches from the main-mast to the stem of the ship.

Quarter-deck is that aloft the steerage, reaching to the round-house.

Flush-deck is that which lies even in a right line fore and aft, from stem to stern.

A rope-deck is that made of cordages, interwoven and stretched over a vessel, thro' which it is easy to annoy an enemy, who comes to board her. They are little used but by small vessels, to defend them from privateers.

**DECKENDORF**, a town of Bavaria, in Germany, situated on the Danube, about thirty-seven miles south-east of Ratisbon: east long.  $13^{\circ}$ , and north lat.  $48^{\circ} 45'$ .

**DECLAMATION**, a speech made in public, in the tone and manner of an oration, uniting the expression of action to the propriety of pronunciation, in order to give the sentiment its full impression upon the mind.

Among the Greeks, declamation was the art of speaking indifferently on all subjects, and on all sides of a question.

With us it is restrained to certain exercises which scholars perform, to teach them to speak in public.

**DECLARATION**, in law, is a formal shewing in writing the ground of complaint of the plaintiff, in an action against the defendant, where the plaintiff is supposed to have received some injury. This declaration ought to be plain and certain, because it impeaches the defendant and obliges him to answer thereto. It is also an exposition of the writ, with the addition of time, circumstances, &c. and must be true as well as clear, for the court will not take things in it by implication: and it sets forth the names both of the plaintiff and defendant, the nature and cause of the action, &c. and the damage received.

Declaration, in an action real, is termed a count. See the article **COUNT**.

**DECLARATION** is also used for a confession which the quakers are obliged to make and subscribe, instead of the oaths of supremacy, &c. See **AFFIRMATION**.

**DECLARATION**, a term of the custom-house, and of commerce in France, contains a particular account or invoice of what is contained in the bales, &c. brought to the offices for entrance inward or outward.

**DECLENSION**,

**DECLENSION**, in grammar, an inflexion of nouns according to their divers cases, as nominative, genitive, dative, &c. It is a different thing in the modern languages, which have not properly any cases from what it is in the antient greek and latin. With respect to languages, where the nouns admit of changes, either in the beginning, the middle, or ending, declension is properly the expression of all those changes in a certain order, and by certain degrees called cases. With regard to languages, where the nouns do not admit of changes in the same number, declension is the expression of the different states a noun is in, and the different relations it has; which difference of relations is marked by particles, and called articles, as *a, the, of, to, from, by, &c.* See **ARTICLE**.

**DECLENSION** of a disease is when it is past its height.

**DECLINATION**, in astronomy, the distance of any celestial object from the equinoctial, either northward or southward. It is either true or apparent, according as the real or apparent place of the object is considered.

The declination being an arch of a secondary of the equinoctial intercepted between a given point and the equinoctial, and perpendicular to the same, the declination of a star, &c. is found in the following manner. First observe the altitude of the pole, as PR (plate LXVII. fig. 6.) this subtracted from  $90^\circ$ , gives the height of the equator AH; then the meridian altitude of the star HD being observed, if it be greater than the altitude of the equator AH, the latter subtracted from the former, leaves the declination northward AD: or if the altitude of the star HT be less than that of the equator AH, the former subtracted from the latter, leaves the declination southward TA. If the star be in the quadrant ZR, then the least altitude MR, subtracted from the altitude of the pole PR, leaves the distance from the pole PM; which subtracted again from the quadrant PQ, leaves the declination MQ.

By this method are constructed the tables of declination of the fixed stars, given us by Ricciolus and Dechalets.

To find the sun's or star's declination by the globe, bring the sun's place, or the star, to the meridian, and the degrees from the equinoctial there reckoned, either north or south, are the declination at noon.

The greatest declination of the sun, or of the ecliptic, is commonly computed  $23^\circ 30'$ . See **ECLIPTIC**.

**Circle of DECLINATION**. See **CIRCLE**.

**Refraction of the DECLINATION**. See the article **REFRACTION**.

**DECLINATION of the sea-compass, or needle**, is its variation from the true meridian of any place. See **VARIATION**.

**DECLINATION of a wall or plane for dials** is an arch of the horizon, contained either between the plane and the prime vertical circle, if you reckon it from the east or west; or else between the meridian and the plane, if you account it from north or south. There are many ways given by authors for finding the declination of a plane, of which all those that depend upon the magnetic needle deserve to be suspected on many accounts. The common method, by finding the sun's horizontal distance from the pole of the plane, is subject to many errors and difficulties. The way therefore we would recommend as the best for finding the declination of a plane, is by a declinator. See the next article.

**DECLINATOR**, or **DECLINATORY**, an instrument contrived for taking the declinations, inclinations, and reclinations of planes. It is constructed in the following manner: on a square wooden board, ABCD (plate LXVII. fig. 7. n<sup>o</sup> 1.) describe a semicircle AED, and divide the two quadrants AE and ED into  $90^\circ$ , each beginning from E, as in the figure: then having fixed a pin in the center F, fit a ruler HI upon the same, moveable thereon, with a box and needle K (*ibid.* n<sup>o</sup> 2.) In order to take the declination of a plane, apply the side AD to the plane proposed, as MN (*ibid.* n<sup>o</sup> 3.) and move the ruler FG, with the compass G, about the center F, till the needle rest upon the line of the magnetical meridian of the place: if the ruler cut the quadrant in E, the plane is either directly northern or southern; but if it cut between D and E, the plane declines to the west; and if between A and E, to the east, by the quantity of the angle GFE.

Would you take the inclinations and reclinations of planes with this instrument, instead of the ruler and needle, a thread with a plummet is fitted on a pin in the center F; then the side BC of the declinator ABCD (*ibid.* n<sup>o</sup> 4.) being applied to the proposed plane, as IL, if the plum-line FG cut the semicircle AED,

**AED** in the point E, the plane is horizontal ; or if it cut the quadrant ED, in any point at G, then will EFG be the angle of inclination : lastly, if applying the side AB to the plane, the plummet cut E, the plane is vertical. Hence if the quantity of the angle of inclination be compared with the elevation of the pole and equator, it is easily known whether the plane be inclined or reclined. See **INCLINATION** and **RECLINATION**.

**DECLINING DIALS**, those which do not face directly any of the four cardinal points. See the article **DIAL**.

**DECLIVIS**, in anatomy, a muscle otherwise called obliquus descendens. See the article **OBLIQUUS**.

**DECLIVITY** denotes just the reverse of acclivity. See **ACCLIVITY**.

**DECOCTION**, in pharmacy, the boiling simples, or other drugs, in order to extract their virtues for some medicinal purpose. The general subjects of decoction are animals and vegetables, and sometimes minerals, as antimony and quicksilver. The liquors which serve to boil them, are water, wine, vinegar, milk, and whey.

Decoction is mostly employed about bal-  
famics, detergents, and cathartics ; for it is not so proper for cephalics, &c. because it exhales the more volatile parts, in which the virtues of all those ingredients consist. The harder bodies, as woods, dried roots, &c. require most boiling ; but herbs and seeds need only be scalded. All those decoctions which are restraining, and most of the cathartics, may, for greater elegance, be clarified ; but all such as are emollient, and intended to consist of the soft and mucilaginous parts of simples are by no means to be so managed.

**DECOLLATION**, beheading, a term frequently used in the phrase, *decollation of St. John Baptist*, which denotes a painting representing the Baptist's head struck off from the body.

**DECOMPOSITE LEAF**, one whose petiole is twice divided before it gives rise to the leaf.

**DECOMPOSITION**, in chemistry and pharmacy, the reduction of a body into its principles or component parts. See the article **ANALYSIS**.

**DECORATION**, in architecture, is used for whatever adorns a building, either with-  
outside or within. The orders of architecture contribute a great deal to the decoration ; but then the several parts of these

orders must have their just proportion, characters and ornaments, otherwise the finest order will bring confusion rather than richness. See **CORINTHIAN**, **COMPOSITE**, &c. **ORDERS**.

Decorations, in churches, are paintings, festoons, vases, &c. occasionally applied to the walls, but with such discretion as not to destroy the form and beauty of the architecture, as is practised in Italy at the solemn feasts. See **FESTOON**, **VASE**, &c.

**DECORATION** also signifies the scenes of theatres. See the article **SCENE**.

In operas and other theatrical performances, they must be often changed, in conformity to the subject.

**DECORTICATION**, the same with barking of trees. See **BARKING**.

**DECORUM**, in architecture, is the suitability of a building, and the several parts and ornaments thereof, to the station and occasion.

Vitruvius is very exact in this point, and gives rules expressly for the appropriating the several orders to their natural characters.

**DECORUM** is used by some to signify the observing a due respect between the inhabitant and habitation. Whence Palladio concludes that the principal entrance must never be regulated by any certain dimensions, but according to the dignity of the person who is to live in it.

**DECOUPLE**, in heraldry, the same as uncoupled : thus, a chevron decouplé, is a chevron wanting so much of it towards the point, that the two ends stand at a distance from one another, being parted and uncoupled.

**DECOURS**, in heraldry, the same with decrement. See **DECREMENT**.

**DECOY**, a place made for catching wild-fowl. Hence,

**DECOY-DUCK** is a duck that flies abroad, and lights into company of wild ones, which by her allurements she draws into the decoy.

**DECREE**, an order made by a superior power, for the regulation of an inferior.

**DECREE**, in the civil law, is a determination that the emperor pronounces upon hearing a particular cause between plaintiff and defendant.

**DECREEES of councils** are the laws made by them, to regulate the doctrine and policy of the church.

**DECREEES in chancery**, are the determinations of the lord chancellor, upon a full hearing of the merits of a cause.

**DECREET**,



**DECREET**, in the law of Scotland, a final decree or judgment of the lords of session, from which an appeal only lies to parliament, where we find them but too often reversed; a circumstance surely not much to the honour of the august bench, from whence the appeal lies.

**DECREMENT**, in heraldry, signifies the wane of the moon from the full to the new. See the article **MOON**.

The moon in this state is called moon decreffant, or in *desours*; and when borne in coat-armour, faces to the left side of the escutcheon, as she does to the right side when in the increment. See the article **CRESCENT**.

**DECREPITATION**, in chemistry, the act of calcining salt over the fire, till it cease to crackle. The design of this is to free the salt from superfluous moisture: but as it is thereby rendered porous, and apt to imbibe the humidity of the air, it must always be kept very close afterwards, lest the air should moisten it anew.

**DECREPITATION** is also applied to the crackling of the salts during the operation.

**DECRETAL**, in the canon-law, a letter of a pope, determining some point or question in the ecclesiastical law. The decretals compose the second part of the canon-law. The first genuine one acknowledged by all the learned as such, is a letter of pope Siricius, written in the year 385, to Himerus bishop of Tarragona, in Spain, concerning some disorders which had crept into the churches of Spain. Gracian published a collection of decretals, containing all the ordinances made by the popes, till the year 1150. Gregory IX. in 1227, following the example of Theodosius and Justinian, formed a constitution of his own, collecting into one body all the decisions, and all the causes, which served to advance the papal power: which collection of decretals was called the *Pentateuch*, because it contains five books.

**DECTA**, in botany, a name used by some for the garden-beet. See **BEE**.

**DECUMANI DENTES**, in heraldry, the same with *dancette*. See the article **DANCETTE**.

**DECUPELATION**, a term used by Harris for decantation. See **DECANTATION**.

**DECUPLE PROPORTION**, that of ten to one. See the article **PROPORTION**.

**DECURIO**, in roman antiquity, a commander of ten men in the army, or the chief of a decury. See **DECURY**.

**DECURIO MUNICIPALIS**, a name given to the senators of the roman colonies.

**DECURIO**, as appears from an inscription in Gruter, was also a name given to certain priests, intended for particular sacrifices or other religious ceremonies. Struvius conjectures that their name was derived from their assisting at the sacrifices of private families and houses.

**DECURRENT LEAF**, one which adheres immediately to the stalk of a plant, without any pedicle, and which has its lower part extended, and running a little way along the branch.

**DECURY**, ten persons ranged under one chief, or leader, called the decurio. See the article **DECURIO**.

The roman cavalry was divided into decuries, which were subdivisions of a century, each century containing ten decuries.

**DECUSSATION**, a term in geometry, optics, and anatomy, signifying the crossing of any two lines, rays, or nerves, when they meet in a point, and then go on separately from one another.

**DECUSSORIUM**, a surgeon's instrument, which, by pressing gently on the dura mater, causes an evacuation of the pus collected between the cranium and the before-mentioned membrane, through the perforation made by the trepan.

**DEDDINGTON**, a market-town of Oxfordshire, about fifteen miles north of Oxford: west longitude  $1^{\circ} 20'$ , and north latitude  $51^{\circ} 55'$ .

**DEDHAM**, a market-town of Essex, about thirty-five miles north-east of Chelmsford: east long.  $1^{\circ} 10'$ , and north lat.  $52^{\circ} 5'$ .

**DEDI**, in conveyances, imports a warranty given to a feeoffee and his heirs. See the article **WARRANTY**.

**DEDICATION**, a solemn devoting, or setting apart, any person or thing, to the service of God, and the purposes of religion. See **CONSECRATION**.

Dedication of a temple was performed by the heathens in the following manner: early in the morning, on the day of dedication, the college of the pontiffs and other orders met, with a great crowd of people; and surrounding the temple, with garlands of flowers, the vestal virgins holding branches of olive-trees in their hands, sprinkled the outside of the temple with lustral water; then the person who consecrated the temple, being the office of some great magistrate, as prætor, censor, &c. drew near the gate, with a pontiff

tiff at his side, to shew him the ceremonies; and holding with one hand the side-post of the gate, spoke thus: *Ades, ades, Lucelle, (for example) dum dedico templum hoc, ut mihi praeatis, postemque teneatis.* Then the pontiff, holding the ceremonial in his hand, pronounced aloud the form of the consecration, which the consecrating person repeated after him, and the ceremony was expressed in these words, *solemnia verba praeunte pontifice effari.* After which they consecrated the court of the temple, by sacrificing a beast, whose entrails were laid on an altar of green turf; then, having taken the statue of the deity to whom it was consecrated, they anointed it with oil, and laid it on a pillow, rubbed with oil: the ceremonies being over, the consecrating person had an inscription, containing his name, quality, and the year of the consecration, set upon the temple. This dedication was to be authorised by the senate and people, and the college of pontiffs was to give their consent to it.

**Feast of DEDICATION**, an anniversary festival among the Jews, in memory of Judas Maccabæus, who repaired and dedicated anew the temple and altar, which had been plundered and profaned by Antiochus Epiphanes. It was observed on the twenty-fifth of Cisleu, and continued eight days.

**The feast of DEDICATION**, or rather the feast of a saint, or patron of a church, called in our law-books *dedicare*, was celebrated not only by the inhabitants of the place, but by those of all the neighbouring villages, who resorted thither; and such assemblies were authorised by the king. The custom is still retained in some places, under the name of wakes, or vigils.

**DEDICATION**, in matters of literature, the inscribing a book, poem, play, or the like, to some person of distinction, serving both as a protection, and honour to them, and a mark of the author's respect for the person to whom he dedicates his work.

Conringius has published a collection of dedications, which may be of use to those employed in this way, as containing many observations relative to divinity, history, physics, &c. according to the different subjects of the books. He has subjoined the prefaces and dedications of Puteanus, published by himself under the title of *Pompæ Prophoneticæ*.

We cannot help observing, that dedications partake much of the nature of pa-

negyric, being not only written in a pompous and florid style, but full of the praises of the patron. See the article **PANEGYRIC**.

One of the most singular dedications we ever met with, and for which the author makes a very good apology, is that of the last part of Mr. Edwards's *History of Birds*; it runs thus:

## T O G O D,

The ONE Eternal! the Incomprehensible! the Omnipresent! Omniscient, and Almighty CREATOR of all things that exist! from Orbs immensurably great, to the minutest Points of Matter, this ATOM is Dedicated and Devoted, with all possible Gratitude, Humiliation, Worship, and the highest Adoration, both of Body and Mind, by

his most resigned, low,  
and humble Creature,

GEORGE EDWARDS.

**DEDICATORY**, something belonging to a dedication. See the preceding article.

**DEDIMUS POTESTATEM**, in law, a commission granted to one or more persons, for the forwarding and dispatching some act appertaining to a judge, or some court; as to take answers in chancery, depositions of witnesses in a cause depending in that court, and levy a fine in the common pleas, &c. where persons live in the country, or cannot travel.

**DEDUCTION**, in commerce, a subtracting or retrenching a little sum paid, from a greater remaining yet unpaid.

**DEDUCTOR**, in roman antiquity, a client or person who attended his patron on public occasions.

**DEDUCTIONE**, in music, a name given to the rising of the voice, in pronouncing the syllables *ut, re, mi, fa, sol, la*; *quia per has deducitur vox*; in contradiction to *reductio*, when the voice descends by these *la, sol, fa, mi, re, ut*; *quia per has reducitur vox*.

**DEE**, the name of several rivers, as that on which Chester stands, that whereon Aberdeen stands, &c. See the articles **CHESTER** and **ABERDEEN**.

**DEED**, an instrument written on paper or parchment, comprehending some contract, bargain, or agreement between the parties thereto, in relation to the matter therein contained.

The validity of a deed consists in three principal things, *viz.* writing, sealing, and delivery. There are two kinds of deeds; *viz.* deeds indented, and deeds poll; which names chiefly import the shape of them, the one being cut in and out at top, and the other plain. A deed indented consists of two or more parts; for there are tripartite, quadripartite, quinquedartite, &c. deeds, in which respective deeds it is expressed, that the parties thereto have interchangeably set their hands and seals. The reason of indenting is, that whereas the several parties have each of them one, the indenture may make it appear, that they belong to one and the same contract, by their tallying. The several parts of deeds by indenture appertain to the feoffer, grantor, or lessor, &c. as to one part; the feeoffee, grantee, or lessee, of another part; and some other persons, as trustees, a third, &c. All the parts of an indented deed, in law, are judged to make but one entire deed, yet each part is of as great force as all the parts together.

A deed poll is that which consists only of one part, without being indented. It is used where a grantor, or venter in a bill of sale, &c. only seals: there is no need of a counterpart, the nature of the contract being such, that it requires no covenant from the grantee.

**DEEMSTERS, or DEMSTERS.** All controversies in the Isle of Man are decided without process, writings, or any charges, by certain judges, chosen yearly from among themselves, called deemsters; there being two of them for each division of the island: they sit judges in all courts, either for life or property; and, with the advice of the twenty-four keys, declare what is law, in uncommon emergencies.

**DEEP SEA-LINE, or DIP-SEA-LINE,** in the sea-language, a small line to sound with, some an hundred and fifty fathom long, with a hollow plummet at the head, and tallow put into it, to bring up stones, gravel, sand, shells, and the like, from the bottom, in order to know the differences of the ground; which being entered from time to time, in their books, by comparing of observations, they guess by their soundings, &c. what coasts they are on, though they cannot see land.

**DEEPING,** a market-town of Lincolnshire, about thirty-five miles south of Lincoln: west lon. 20°, and north lat. 52° 35'.

**DEER, *cervus*,** in zoology. See the article **CERVUS**,

**DEER-HAYS,** large nets, made of cords, to catch deer. Whoever keeps them, except in his own park, forfeits forty shillings a month.

**DEER-STEALERS** are punishable by various laws and statutes, made from time to time. Any offender convicted of deer-stealing, before a judge of gaol-delivery, may be transported by 5 Geo. I. cap. xxviii. And it is felony for persons to appear armed and disguised in a forest or park, and hunt or kill the deer, by 6 Geo. I. cap. xxii.

**DEER-WEED,** a name given to the luteola of botanists. See **LUTEOLA**.

**DE ESSENDO QUIETUM DE TOLONIO,** in law, a writ which lies for those, who, by privilege, are free from the payment of toll, whenever they are disturbed therein.

**DE EXPENSIS MILITUM,** in law, an ancient writ, commanding the sheriff to levy the expences of a knight of the shire, for his attendance in parliament, being four shillings a day. There is also another writ of the like nature, *de expensis civium & burgenfium*, for levying two shillings a day, for the expences of every citizen and burgess of parliament.

**DE FACTO,** something actually in fact, or existing, in contradistinction to *de jure*; where a thing is only so in justice, but not in fact: as a king *de facto* is a person that is in actual possession of a crown, but has no legal right to the same; and a king *de jure* is the person who has a just right to the crown, though he is out of possession thereof.

**DEFAMATION,** the speaking slanderous words of another; for which the slanderer is punishable, according to the nature of his offence, either by action upon the case at common law, or by statute, or in the ecclesiastical court. No damages are given in the ecclesiastical court, but the punishment of the party is by way of penance.

**DEFAULT,** in law, is generally taken for non-appearance in court, at a day assigned; but imports any omission of that which we ought to do, for which judgment may be given against the defaulter. In the usual sense, if the plaintiff in a suit make default in appearance on a trial, he will be non-suited; and where a defendant makes default, judgment shall be had against him by default. Jurors making default in their appearance, are to lose and forfeit issues.

**DEFEASANCE**, or **DEFEISANCE**. See the article **DEFEISANCE**.

**DEFECATE**, or **DEFÆCATE**, in chemistry, a term applied to a body freed and purged from fæces and impurities. See the article **CLARIFICATION**, &c.

**DEFECTION**, the deserting, abandoning, or falling off from a party, or interest, a person had been engaged in.

**DEFECTIVE**, in general, an appellation given to things which want some of the properties that naturally they ought to have. Thus,

**DEFECTIVE NOUNS** are those which want one of the numbers, or one or more cases. See the article **NOUN**.

**DEFECTIVE THIRD**, among musicians, the same with diminished third. See the article **DIMINISHED**.

**DEFEISANCE**, or **DEFEASANCE**, in our law, a condition relating to some certain deed, which being performed, the deed is defeated and rendered void, as if it had never been made.

There is this difference between a common condition and a defeisance, *viz.* that the condition is inserted in, or annexed to the deed; but the defeisance is a deed by itself, which has relation to another deed.

**DEFENCE**, in fortification, all sorts of works that cover and defend the opposite posts, as flanks, casemates, parapets, and faussebrays.

It is almost impossible to fix the miner to the face of a bastion, till the defences of the opposite one are ruined, that is, till the parapet of its flank is beaten down, and the cannon, in all parts that can fire upon that face which is attacked, are dismounted.

*To be in a posture of* **DEFENCE**, is to be in a condition to resist or oppose an enemy.

*Line of* **DEFENCE**, a supposed line drawn from the angle of the curtain, or from any other part in the curtain, to the flanked angle of the opposite bastion. See the articles **CURTIN** and **BASTION**.

A line of defence represents the flight of a musquet-ball from the place where the musqueteers stand, to scour the face of the bastion, and ought never to exceed the reach of a musquet. It is either *sichant* or *razant*; the first is when it is drawn from the angle of the curtain to the flanked angle: the last, when it is drawn from a point in the curtain, razing the face of the bastion.

**DEFENCE**, in law, signifies a plea, or what the defendant ought to make after the

plaintiff's count, or declaration, *viz.* that he defends all the wrong, force, and damages, where and when he ought, &c. If the defendant would plead to the jurisdiction, he must omit the words *where and when he ought*; and if he would shew any disability in the plaintiff, and demand judgment, if the plaintiff shall be answered unto, then he ought to omit the defence of the damage. There is a full defence usually in personal actions.

**DEFENCES**, in heraldry, are the weapons of any beast, as the horns of a stag, the tusks of a wild bear, &c.

**DEFEND**, a term used in our old statutes, for, to prohibit or forbid.

**DEFENDANT**, in law, the person sued in an action personal; as tenant is he who is sued in an action real. See **ACTION**.

**DEFENDEMUS**, in law, a word formerly used in gifts and grants, having this force, that it binds the donor and his heirs to defend the donee, if any persons claimed right to, or laid any incumbrance on, the thing given, otherwise than is contained in the deed of gift.

**DEFENDER of the faith**, a peculiar title, belonging to the king of Great Britain, as Catholic does to the king of Spain, Christian to the king of France, &c.

This title was first given by pope Leo X. to king Henry VIII. for writing against Luther.

**DEFENDERE SE PER CORPUS SUUM**, signified to offer duel or combat. See the articles **COMBAT** and **DUEL**.

**DEFENERRE UNICA MANU**, in law-writers, signifies to wage law by denying the accusation upon oath.

**DEFENDERS**, in church-history, the same with advocates. See **ADVOCATE**.

**DEFENDING**, in fortification, the same with flanking. See the articles **DEFENCE** and **FLANKING**.

**DEFENSITIVE**, in surgery, signifies a bandage, plaster, &c. to defend any part from external injuries.

**DEFENSOR**, **DEFENDER**, in ecclesiastical writers, the same with advocate. See the article **ADVOCATE**.

**DEFERENT**, in anatomy, a term applied to certain vessels in the body, that serve for the conveyance of humours from one part to another. See **DEFERENTIA VASA**.

**DEFERENT**, in the ptolemaic astronomy, a circle invented to account for the eccentricity, perigee, and apogee of the planets. See the articles **EPICYCLE** and **PTOLEMAIC SYSTEM**.

**DEFERENTIA**

**DEFERENTIA VASA**, two white, solid, flattened tubes, one lying on the right side, the other on the left, from the epididymis, of which they are continuations: each of them runs up in the cellular vagina of the spermatic vessels, as high as the openings in the abdominal muscles; the blood vessels lying forward, and the vas deferens behind them.

Their use is to carry the semen from the epididymes to the vesiculæ seminales; and, in the coitus, to discharge it into the urethra.

**DEFFAIT**, or **DECAPITE**, a term used by the french heralds, to signify that a beast has the head cut off smooth; in contradistinction to *estete*, which we call *erased*, where the head is, as it were, torn off, leaving the neck ragged.

**DEFICIENT**, in general, signifies much the same with defective. See **DEFECTIVE**.

**DEFICIENT HYPERBOLA**, one with only one asymptote, and two hyperbolic legs running out infinitely towards the asymptote, but contrary ways. See the article **HYPERBOLA**.

**DEFICIENT INTERVAL**, in music, one less by a comma than it ought to be. See **COMMA** and **INTERVAL**.

**DEFICIENT NUMBERS**, those whose parts or multiples added together, fall short of the integer whereof they are the parts; such is 8, its parts, 1, 2, 4, making only 7. See the article **NUMBER**.

**DEFILE**, in fortification, a strait narrow passage, through which a company of horse or foot can pass only in file, by making a small front; so that the enemy may take an opportunity to stop their march, and to charge them with so much the more advantage, in regard that those in the front and rear, cannot reciprocally come to the relief of one another.

To **DEFILE** is to reduce an army to a small front, in order to march through a defile.

**DEFINITE**, in grammar, is applied to an article that has a precise determinate signification; such as the article *the* in english, *le* and *la* in french, &c. which fix and ascertain the noun they belong to some particular, as *the king*, *le roy*; whereas in the quality of *king*, *de roy*, the articles of and *de* mark nothing precise, and are therefore indefinite.

**DEFINITION**, the shewing the meaning of one word by several other not synonymous terms.

The meaning of words being only the ideas they are made to stand for, by him that uses them, the meaning of any term is

then shewed, or the word is defined; when, by other words, the idea it is made the sign of, and is annexed to it in the mind of the speaker, is, as it were, represented and set before the view of another; and thus its signification is ascertained. This is the only end and use of definitions, and therefore the only measure of what is, or is not, a good definition.

The names then of simple ideas are incapable of being defined, because the several terms of a definition signifying several ideas, they can altogether by no means, represent an idea which has no composition at all; and therefore a definition, which is properly but shewing the meaning of any one word by several others, not signifying the same each, can in the names of simple ideas have no place.

Definitions, which then take place in compound ideas only, are of two sorts: the definition of the name, which is the explanation of what any word means; and the definition of the thing, which explains in what the nature of that thing consists.

In order to form a definition of any thing, we must employ these three acts of the mind, first compare the thing to be defined with other things that are most like to itself, and see wherein its essence and nature agrees with them; and that is called the general nature or genus in a definition: so, if you would define what *wine* is, first compare it with other things like itself, as cyder, perry, &c. and you will find that it agrees essentially with them in this, that it is a sort of juice. Secondly, consider the most remarkable and primary attribute, property, or idea, wherein the thing differs from those other things that are most like it, and that is its essential or specific difference: so that wine differs from cyder and perry, and all other juices, in its being pressed from a grape. This may be called its special nature, which distinguishes it from other juices.

Thirdly, join the general and special nature together, or the genus and the difference, and these make up a definition; so the juice of a grape, or juice pressed from grapes, is the definition of wine. Here it must be observed, that in speaking of the genus and difference, as composing a definition, it must always be understood, that the nearest genus and specific difference are required.

The next general nature, or the nearest genus, must be used in a definition, because

cause it includes all the rest; as if I were to define *wine*, I must say, *wine is a juice*, which is the nearest genus; and not say, *wine is a liquid*, which is a remote general nature; or, *wine is a substance*, which is yet more remote, for *juice* includes both *liquid* and *substance*. Besides neither of these two remote general natures would make any distinction betwixt wine and a thousand other substances, or other liquids: a remote genus leaves the thing too much undistinguished. The specific difference is that primary attribute which distinguishes each species from one another, while they stand ranked under the same general nature or genus; so that the specific difference of wine is its pressure from the grape, as cyder is pressed from apples, and perry from pears. In definitions we must also use the primary attribute that distinguishes the species, or special nature; and not attempt to define wine by its particular tastes, or effects, or rather properties, which are but secondary, or consequential, when its pressure from the grape is the most obvious and primary distinction of it from all other juices. In some cases, indeed, it is not so easily known, which is the primary idea that distinguishes one thing from another; so some would as soon define winter by the coldness of the season, as by the shortness of the days, tho' the shortness of the days is doubtless the most just, primary, and philosophical difference; since winter-days are always the shortest, but not always the coldest: besides, the shortness is one cause of the coldness, but the coldness is no cause of their shortness.

The special rules for a good definition are these: 1. A definition must be universal, or adequate, that is, it must agree to all the particular species or individuals that are included under the same idea. 2. It must be proper, and peculiar to the thing defined, and agree to that alone. These two rules, being observed, will always render a definition reciprocal with the thing defined, that is, the definition may be used in the place of the thing defined; or they may be mutually affirmed concerning each other. 3. A definition should be clear and plain; and indeed it is a general rule concerning the definition both of names and things, that no word should be used in either of them, which has any difficulty in it, unless it has been before defined. 4. A definition should be short, so that it must have no tautology in it,

nor any words superfluous. 5. Neither the thing defined, nor a mere synonymous name should make any part of the definition.

Though the defining by the genus and difference be the shortest way, yet it may be doubted whether it be the best; certainly it is not the only, and so not absolutely necessary. Thus, *man* may be defined to be a *solid extended substance, having life, sense, spontaneous motion, and the faculty of reasoning*: and certainly the meaning of the word *man* would be as well understood as when it is defined a *rational animal*.

DEFINITION, in rhetoric, is defined by Cicero, a short comprehensive explanation of a thing.

The definitions of the orator, it must be observed, differ much from those of the logician and philosopher: the orators take a large compass, and define things more ornamentally: thus, *man is a curious work of an almighty creator, framed after his own image, endued with reason, and born with immortality*: but this rhetorical definition, in strictness, comes nearer to the nature of a description, than any accurate definition.

DEFINITIVE, a term applied to whatever terminates a process, question, &c. in opposition to provisional and interlocutory.

DEFINITOR is used for an assessor or counsellor of a general or superior in monasteries, or other religious places. See MONASTERY and CONVENT.

DEFLAGRATION, in chemistry, the kindling or setting fire to a salt, mineral, &c. either alone or mixed for that purpose, with a sulphureous one, in order to purify it.

The following process is much recommended for its use in trying the strength of brandies, or other vinous liquor: measure out a quantity of the liquor, and then heat it, and set it on fire; if, after it ceases to burn, the quantity remaining is half as much as that measured out for the trial was, then the spirit is found to consist of half water, and half totally inflammable spirit, that is, it is what we understand by perfect proof; and according as the remainder is more or less than half the original quantity, it is so much below or so much above proof. This method is much more certain than that by the crown of bubbles, which arises upon shaking the spirit in a phial. The above process has been greatly improved by Mons. Geoffroy. See Mem. Acad. Paris, 1718.

DEFLECTION

**DEFLECTION**, of the rays of light, a property which Dr. Hook observed in 1675, and read an account of before the Royal Society, March 18, the same year. He says, he found it different both from reflection and refraction, and that it was made towards the surface of the opaque body, perpendicularly.

This is the same property, which Sir Isaac Newton calls inflection. See the article **INFLECTION**.

**DEFLOWERING**, the act of taking away a woman's virginity. See the article **VIRGINITY**.

**DEFLUXION**, in medicine, the falling of humours from a superior to an inferior part of the body. See the articles **CATARRH** and **PHTHISIS**.

**DEFLUXION** on the eyes. See the article **EYE**.

**DEFORCEMENT**, in law, the casting any one out of his land, or a withholding of lands and tenements by force from the right owner.

**DEFORCEMENT**, in the law of Scotland, is used for resisting, or offering violence to the officers of the law, while they are actually employed in the exercise of their functions, by putting its orders and sentences in execution.

The punishment of this crime is confiscation of moveables, joined with some arbitrary punishment, as fine, imprisonment, banishment, or corporal pains, according to the degrees of violence, and other circumstances which aggravate the crime.

**DEFORCEOR**, in law, is a person that overcomes and casts forth another from his lands and tenements by force, and differs from a disseisor on this account.

1. That a man may be disseised without force. 2. A man may deforce another that never was in possession, as where many have a right to lands, as common heirs, and one of them enters and keeps out the rest. A deforceor likewise differs from an intruder who is made by a wrongful entry only into land, &c. void of a possessor, whilst a deforceor is he that holds out against the right heir. See the articles **DISSEISOR** and **INTRUSION**.

**DEFORMITY**, the want of that uniformity necessary to constitute the beauty of an object. See the article **BEAUTY**. The deformity of the body may be prevented by forming and moulding it in infancy, as by stroking up the calves of the legs to keep them from falling too

low; and by stroking up the forehead, to keep it from sinking, by proper bandages, &c.

According to a late ingenious writer, the proper province of a deformed person is the improvement of the mind; and his business, only such as depends on ingenuity. If he cannot be a dancing-master, to adjust the heels, he may be a school-master, to instruct the head. He would appear ill, as a herald in a procession; but may pass very well, as a merchant upon the exchange. He cannot be a graceful actor on the stage, but he may produce a good play. He can acquire no glory by the sword, but he may by the pen. On looking about him, he will find many avenues to fame barred against him: but some are still open, through that of virtue; and those, if he has a right ambition, he will most probably attempt to pass.

In this manner does that truly ingenious writer apologize for, and make the encomium of deformity. See *Hay's Essay on Deformity*.

**DEFOSSION, BURYING ALIVE**, a punishment which the Romans inflicted on such of the vestals as were guilty of incontinency. The Hungarians too are said to punish women convicted of adultery in the same manner.

**DEFTERDAR, or DEFTARDAR**, in the turkish and persian polity, an officer of state, answering to our lord treasurer, who appoints deputies in every province. See the article **TREASURER**.

**DEGENERATION, or DEGENERATING**, in general, denotes the growing worse, or losing some valuable qualities whereof a thing was formerly possessed.

Some naturalists have been of opinion, that things are capable of degenerating into a quite distinct species; but this is a chimera. All that happens, in the degeneration of a plant, for instance, is the losing its usual beauty, colour, smell, &c. a misfortune entirely owing to its being planted in an improper soil, climate, &c.

**DEGLUTITION**, in medicine, the act of swallowing the food performed by means of the tongue driving the aliment into the oesophagus, which, by the contraction of the sphincter, protrudes the contents downwards.

**DEGRADATION**, the act of depriving a person for ever of a dignity or degree of honour, and taking away the title, badge and privileges of it.

**DEGRA-**

**DEGRADATION** is also a punishment of delinquent ecclesiastics. The canon-law distinguishes it into two sorts, the one summary by word only; the other solemn, by stripping the person degraded of those ornaments and rights which are the ensigns of his order or degree. The canonists likewise distinguish degradation from deposition, understanding by the latter the depriving a man of his clerical orders, but by the former, only the removing him from his rank or degree. In the antient primitive church, degrading a clergyman was reducing him to the state and communion of laymen, by which Vossius and others understand the thrusting down a clergyman to communicate with laymen, without the rails of the chancel. The full import of the phrase, however, is the depriving him of his orders, and reducing him to the simple condition of a layman, a punishment inflicted for several offences, as adultery, theft, or fraud: and clergymen thus reduced, were seldom allowed to recover their antient station, except upon some great necessity, or very pressing reason. Some have thought that degradation did not reduce the clergy to the state of mere laymen, and that on account of the indelible character acquired by ordination, but this is an opinion unknown to the antient writers of the christian church. Degradation in the romish church is attended with a great deal of ceremony. The offender is stripped of his pontifical vestments, and at the same time the person who degrades him scrapes his fingers with a knife, or a little piece of glass, declaring to him that the power of consecrating, blessing and sanctifying, is taken from him: he erases the marks of the tonsure in the same manner, which a barber compleats by shaving his head all over.

**DEGRADATION**, in painting, expresses the lessening the appearance of distant objects in a landscape, in the same manner as they would appear to an eye placed at that distance from them. See the articles **PERSPECTIVE** and **LANDSKIP**.

**DEGRADED CROSS**, in heraldry, a cross divided into steps at each end, diminishing as they ascend towards the center, called by the french *perronnée*. See plate LXVII. fig. 8.

**DEGREE**, in geometry, a division of a circle, including a three hundred and sixtieth part of its circumference.

Every circle is supposed to be divided into three hundred and sixty parts, called degrees, and each degree divided into sixty other parts, called minutes; each of these minutes being again divided into sixty seconds, each second into thirds, and each third into fourths, and so on. See the articles **MINUTE**, **SECOND**, &c. By this means no more degrees or parts are reckoned in the greatest circle than in the least that is, and therefore if the same angle at the center be subtended by two concentric arches, as many degrees are counted in the one, as in the other; for these two arches have the same proportion to their whole peripheries. For example. Let ACB (plate LXVII. fig. 9.) be an angle, and from the center C let there be described two arches, A B, D E, subtending the angle. There are as many degrees and minutes contained in the arch A B, as in the arch D E, altho' the radius of the arch A B were only a foot long, and the radius of the other reached the fixed stars. It is true indeed that a degree in the arch A B is so much less than a degree of the arch D E, as its radius C B is less than C E. The angle C is said to be of so many degrees or minutes as the arch which subtends it contains of such parts.

**DEGREE of latitude.** See the article **LATITUDE**.

**DEGREE of longitude.** See the article **LONGITUDE**.

A degree of the meridian on the surface of the globe is variously determined by various observers. Mr. Picart measured a degree in the latitude of  $49^{\circ} 21'$ , and found it equal to 57060 french toises. But the french mathematicians, who have lately examined Mr. Picart's operations, assure us, that the degree in that latitude is 57183 toises. Our countryman Mr. Norwood measured the distance between London and York, and found it 905751 english feet, and finding the difference of latitudes  $2^{\circ} 28'$ , determined the quantity of one degree to be 367196 english feet, or 69 english miles, 288 yards. Mr. Maupertuis measured a degree in Lapland, in the latitude of  $66^{\circ} 20'$ , and found it 57438 toises. A degree was likewise measured at the equator by other french mathematicians, and found to be considerably less than in the latitude of Paris. Whence it appears, that the earth is not a sphere, but an oblate spheroid. See the articles **EARTH**, **SPHEROID**, &c.



Our theory of navigation being founded upon an hypothesis of the degrees of latitude being all equal, must of consequence be very erroneous, wherefore we here insert a table of the degrees

in the quadrantal arch of the meridian, both in the sphere and spheroid with their differences, as calculated by the Rev. Mr. Murdoch.

A Table of Arches of the Meridian to the Spheroid and Sphere, in Minutes of the Equator.

Degrees	Sphe- roid.	Sphere.	Diff.	Degrees	Sphe- roid.	Sphere.	Diff.
1	58.7	60.0	1.3	46	2716.4	2760.0	43.6
2	117.3	120.0	2.7	47	2776.2	2820.0	43.8
3	176.0	180.0	4.0	48	2835.9	2880.0	44.1
4	234.7	240.0	5.3	49	2895.5	2940.0	44.5
5	293.4	300.0	6.6	50	2955.3	3000.0	44.7
6	352.1	360.0	7.9	51	3015.2	3060.0	44.8
7	410.8	420.0	9.2	52	3075.0	3120.0	44.9
8	469.6	480.0	10.4	53	3135.0	3180.0	45.0
9	528.3	540.0	11.7	54	3194.9	3240.0	45.1
10	587.0	600.0	13.0	55	3254.9	3300.0	45.1
11	645.8	660.0	14.2	56	3314.9	3360.0	45.1
12	704.5	720.0	15.5	57	3370.0	3420.0	45.0
13	763.3	780.0	16.7	58	3435.1	3480.0	44.9
14	822.1	840.0	17.9	59	3495.2	3540.0	44.8
15	880.9	900.0	19.1	60	3555.3	3600.0	44.7
16	939.7	960.0	20.3	61	3615.5	3660.0	44.5
17	998.5	1020.0	21.5	62	3675.7	3720.0	44.3
18	1057.4	1080.0	22.6	63	3736.0	3780.0	44.0
19	1116.3	1140.0	23.7	64	3796.2	3840.0	43.8
20	1175.2	1200.0	24.8	65	3856.5	3900.0	43.5
21	1234.1	1260.0	25.9	66	3916.8	3960.0	43.2
22	1293.0	1320.0	27.0	67	3977.2	4020.0	42.8
23	1352.0	1380.0	28.0	68	4037.5	4080.0	42.5
24	1411.0	1440.0	29.0	69	4097.9	4140.0	42.1
25	1470.0	1500.0	30.0	70	4158.4	4200.0	41.6
26	1529.0	1560.0	31.0	71	4218.8	4260.0	41.2
27	1588.1	1620.0	31.9	72	4279.3	4320.0	40.7
28	1647.2	1680.0	32.8	73	4339.8	4380.0	40.2
29	1706.3	1740.0	33.7	74	4400.3	4440.0	39.7
30	1765.5	1800.0	34.5	75	4460.8	4500.0	39.2
31	1824.7	1860.0	35.3	76	4521.3	4560.0	38.7
32	1883.9	1920.0	36.1	77	4581.9	4620.0	38.1
33	1943.1	1980.0	36.9	78	4642.5	4680.0	37.5
34	2002.4	2040.0	37.6	79	4703.1	4740.0	36.9
35	2061.7	2100.0	38.3	80	4763.7	4800.0	36.3
36	2121.0	2160.0	39.0	81	4824.3	4860.0	35.7
37	2180.4	2220.0	39.6	82	4884.9	4920.0	35.1
38	2239.8	2280.0	40.2	83	4945.5	4980.0	34.5
39	2299.2	2340.0	40.8	84	5006.2	5040.0	33.8
40	2358.7	2400.0	41.3	85	5066.8	5100.0	33.2
41	2418.2	2460.0	41.8	86	5127.5	5160.0	32.5
42	2477.7	2520.0	42.3	87	5188.2	5220.0	31.8
43	2537.3	2580.0	42.7	88	5248.8	5280.0	31.2
44	2596.8	2640.0	43.2	89	5309.5	5340.0	30.5
45	2656.6	2700.0	43.4	90	5370.2	5400.0	29.8

**DEGREE**, in the civil and canon-law, denotes an interval in kinship, by which proximity and remoteness of blood are computed. In computing degrees of consanguinity, the rule of the civil law is universal, either in the direct or collateral, otherwise called the oblique line, for as many generations as there are, so many degrees there are likewise. But in the canon-law, the rule is different for the oblique line. And here a distinction is made between the equal and the unequal oblique line. In the first case the rule is, as many degrees as the persons allied are distant from the common stock, so many they are distant from one another. In the other case the rule is: As many degrees as the most remote is distant from the common stock, so many the persons are distant from one another. Hence the sister of a person's grandfather by the civil law is distant from that person in the fourth degree; whereas, by the canon-law, she is only in the third degree.

**DEGREE**, in chemistry, denotes the state or intensity of fire. See **FIRE**.

**Conjoint DEGREES**. See **CONJOINT**.

**DEGREES of comparison**, in grammar. See **COMPARISON** and **POSITIVE**, **COMPARATIVE** and **SUPERLATIVE**.

**DEGREES**, in music, are the little intervals whereof the concords, or harmonical intervals are composed. See the articles **INTERVAL** and **CONCORD**.

Musical degrees are three, 1st. The greater tone, whose ratio is 8 : 9. 2. The less tone, whose ratio is 9 : 10. and 3. The semitone, whose ratio is 15 : 16. By these alone a sound can be moved upwards or downwards successively, from one extreme of a concord to another, and produce true melody; and by means of these, several voices are also capable of the necessary variety in passing from concord to concord. As to the original of these degrees, they arise out of the simple concords, and are equal to their differences. Thus 8 : 9, is the difference of a fourth and a fifth; 9 : 10, is that of a lesser third and fourth, or of a fifth and greater sixth; and 15 : 16, is the difference of a greater third and fourth, or of a fifth and a lesser sixth.

The degrees being only certain mediums contrived to be put betwixt the extremes of concords, for moderating their inequality, are of use only with regard to concords; so that when the voice has moved one degree, the ear is not satisfi-

fied till we come to the other, which therefore must be concord to the first sound. By the fit division therefore, of the concurring intervals into lesser ones, the voice will move smoothly from one note to another, and the hearer be prepared for a more exquisite relish of the perfect intervals, whose extremes are the proper notes in which the ear finds the expected rest and pleasure. For the use of the degrees in the construction of the scale of music. See **SCALE** and **GAMUT**.

**DEGREES** in the peripatetic philosophy, are those entities which being multiplied in the same subject render it more active, and that intensively rather than extensively.

**Parodical DEGREE**, in algebra. See the article **PARODICAL**.

**DEGREE**, in universities, denotes a quality conferred on the students or members thereof as a testimony of their proficiency in the arts or sciences, and intitling them to certain privileges.

The degrees are much the same in all universities, but the laws thereof, and the previous discipline or exercise differ. The degrees are bachelor, master, and doctor, instead of which last, in some foreign universities, they have licentiate.

In each faculty, there are two degrees, bachelor and doctor, which were antiently called bachelor and master. In the arts likewise there are two degrees which still retain the antient denomination, *viz.* bachelor and master. See **BACHELOR**, **MASTER**, **DOCTOR**.

With regard to obtaining degrees at Oxford and Cambridge, matters are nearly on the same footing; only at Cambridge, the discipline is somewhat more severe, and the exercises more difficult. For the degree of bachelor of arts, besides residence in the university near four years, it is required that the person in the last year have defended three questions in natural philosophy, mathematics, or ethics, and answered the objections of three several opponents at two several times; as also, that he have opposed three times. After which, being examined by the master and fellows of the college, he is referred to seek his degree in the schools, where he is to sit three days, and be examined by two masters of arts appointed for the purpose. For the degree of master of arts, the candidate is obliged three several times to maintain two philosophical questions in the public schools, and to answer the objections brought against

against him by a master of arts. He must also keep two acts in the bachelors school, and declaim once.

To pass bachelor of divinity, the candidate must have been seven years master of arts : he must have opposed a bachelor of divinity twice, kept one divinity act, and preached before the university once in latin, and once in english.

For the degree of doctor. See DOCTOR.

DECIDE, *decida*, a term only used for the condemnation and execution of the Saviour of the world, by Pontius Pilate and the Jews.

DEJECTION, in medicine, the act of ejecting or evacuating the excrements. It is also applied to the excrements themselves thus evacuated, in which sense it is of the same import with stool. See the article STOOL.

DEJECTION, in astrology, is applied to the planets when they have lost their influence, as is pretended by reason of their being in opposition to some others : It is the contrary of their exaltation. See the article EXALTATION.

DEIFICATION, in antiquity, the same with apotheosis. See APOTHEOSIS.

DEINCLINERS, or DEINCLINING DIALS, are such as both decline and incline, or recline at the same time. Thus, if a plane cut the prime vertical circle at an angle of thirty degrees, and the horizontal plane under an angle of twenty-four degrees, the elevation of the pole being fifty-two degrees, a dial drawn on this plane is called a deincliner. See DIAL.

DEIPARA, MOTHER OF GOD. See the article MOTHER.

DEISM, the system of religion acknowledged by the deists. See the next article.

DEISTS, in the modern sense of the word, are those persons in christian countries, who acknowledging all the obligations and duties of natural religion, disbelieve the christian scheme, or revealed religion. They are so called from their belief in God alone, in opposition to Christians. The learned Dr. Clarke taking the denomination in the most extensive signification, distinguishes deists into four sorts. 1. Such as pretend to believe the existence of an eternal, infinite, independent, intelligent Being, and who teach that this supreme Being made the world, though they fancy he does not at all concern himself in the management of it. 2. Those who believe not only the being, but also the providence

of God with respect to the natural world, but who not allowing any difference between moral good and evil, deny that God takes any notice of the morally good or evil actions of men ; these things depending, as they imagine, on the arbitrary constitutions of human laws. 3. Those who having right apprehensions concerning the natural attributes of God, and his all-governing providence, and some notion of his moral perfections also ; yet being prejudiced against the notion of the immorality of the human soul, believe that men perish intirely at death, and that one generation shall perpetually succeed another, without any future restoration or renovation of things. 4. Such as believe the existence of a supreme Being, together with his providence in the government of the world, as also the obligations of natural religion ; but so far only, as these things are discoverable by the light of nature alone, without believing any divine revelation. These last are the only true deists ; but as the principles of these men would naturally lead them to embrace the christian revelation, the learned author concludes there is now no consistent scheme of deism in the world.

DEITY, a term frequently used in a synonymous sense with God. See GOD.

DELEGATES, commissioners appointed by the king under the great seal to hear and determine appeals from the ecclesiastical court.

Court of DELEGATES. See COURT.

DELEGATION, *delegatio*, a commission extraordinary given by a judge to take cognizance of, and determine, some cause, which ordinarily does not come before him.

DELEGATION, in the civil law, is a kind of nomination, whereby a debtor appoints one that is debtor to him, to answer a creditor in his place. This delegation differs from transferring, or translation, in that three persons intervene in a delegation, viz. the creditor, the debtor, and a third indebted to the debtor, whereas in a transfer, it is enough that the transferer and transferee be present.

DELETERIOUS, an appellation given to things of a destructive or poisonous nature. See POISON.

DELF, denotes a quarry or mine, where either stone or coal is dug ; but is more particularly used for the veins of coal

lying under-ground, before it is dug up. A delf, or delve of coals, also denotes a certain quantity when dug.

**DELF**, in heraldry, is by some supposed to represent a square rod or turf, and to be so called from delving, or digging. A delf tenne, is due to him that revokes his own challenge, or any way goes from his word; and to such this is given as an abatement to the honour of their arms, and is always placed in the middle of the escutcheon. However, if two or more delfs are found in an escutcheon, they are not then to be looked upon as signs of an abatement, but of honour. Also, if it be of metal, or charged upon, it then becomes a charge of perfect bearing.

**DELFT**, a city of the united Netherlands, in the province of Holland, eight miles north-east of Rotterdam, and thirty south-west of Amsterdam: east long.  $4^{\circ} 5'$ , and north lat.  $52^{\circ} 6'$ .

**DELIA**, in antiquity, feasts celebrated by the Athenians in honour of Apollo, furnished Delius, the principal ceremony whereof was an embassy, or rather a pilgrimage to Apollo, performed every five years by a certain number of citizens, deputed for that purpose, called deliastæ, and the first person of the embassy architheorus: to him were added, four more of the family of the Ceryci, priests descended from Mercury, who resided all the year at Delos, to assist in the temple. The whole deputation set out in five vessels, carrying with them every thing necessary for the feast and the sacrifices.

**DELIA** was also a quinquennial festival in the island of Delos, instituted by Thefeus, at his return from Crete, in honour of Venus, whose statue, given him by Ariadne, he erected on that place, having by her assistance met with success in his expedition.

**DELIAC**, or **DELIACAL PROBLEM**, a problem much celebrated in the writings of the antients, concerning the duplication of the cube. See the articles **DUPPLICATION** and **CUBE**.

**DELIBAMENTA**, in antiquity, a libation to the infernal gods, always offered by pouring downwards. See **LIBATION**.

**DELIBERATIVE**, an appellation given to a kind, or branch, of rhetoric, employed in proving a thing, or convincing an assembly thereof, in order to persuade them to put it in execution.

To have a deliberative voice in the assembly, is when a person has a right to give his advice and his vote therein. In councils, the bishops have deliberative voices; those beneath them have only consultative voices.

**DELICT**, in the scotch law, denotes much the same with misdemeanour. See the article **MISDEMEANOUR**.

**DELIGATION**, in surgery, the binding up of wounds, dislocations, fractures, &c. See the articles **WOUND**, **DISLOCATION**, **FRACTURE**, &c.

**DELIMA**, in botany, a genus of plants belonging to the *polyandria-monogynia* class, with an elongated style: it has no flower-petals; the cup consists of five leaves; the fruit is a bivalve capsule, and contains two seeds.

**DELINEATION**, or **DELINEATING**, the same with designing. See the article **DESIGNING**.

**DELINQUENT**, a guilty person, or one who has committed some fault, or offence, for which he is punishable.

**DELIQUIUM**, or **ANIMI DELIQUIUM**, the same with lipothymia. See the article **LIPOTHYMIA**.

**DELIQUIUM**, in chemistry, signifies the solution of any body, when exposed to a cool and damp place, by the humidity it attracts from the air. The salt of tartar dissolved in the above manner is called oil of tartar per deliquium.

**DELIRIUM**, in medicine, the production of ideas not answerable to external causes, from an internal indisposition of the brain, attended with a wrong judgment following from those ideas, and an affection of the mind, and motion of the body, accordingly: and from these increased through various degrees; either alone or joined together, various kinds of deliria are produced.

The causes of deliria are numerous, such as fevers, wounds in the head, internal inflammations, and immoderate losses of blood, whereby the brain is either disordered or weakened. It also arises from the feed or menses being retained in the womb, from the rotting of a gangrened member, &c. When a fierce and continual delirium is produced by an acute fever, from the brain itself originally affected, it is called a phrenzy: but a simple delirium only attends a violent fit of an intermitting fever, so that when the paroxysm is off, the delirium ceases. See the article **PHRENZY**.

Many

Many are the signs of a delirium, as gnashing of the teeth, a fierce and wild aspect, a pulsation in the hypochondrium and belly, watchings, vomiting of bile, in pains of the head, a tremor, or trembling of the tongue, &c. to all which Gallen adds, the doing any thing unusual, or indecent.

Various methods of cure, and different remedies are to be chose agreeable to the difference of the causes; but the chief of these remedies are warm bathing of the feet, with the application of blisters to them, and to the hams; frictions upon the same parts; diluent clysters often applied; a thin diet, and healing, quieting, deobstruent and diluent drinks; emollient remedies applied to the head; gentle purges; bleeding in the foot, a bringing down of the piles, or menstrual discharge, &c.

A delirium is always a bad sign in wounds of the head, because it denotes that the brain itself is injured.

**DELIVERANCE**, in law. See the article **REPLEGIARE**.

**DELIVERY, CHILD-BIRTH, or PARTURITION**, in medicine and surgery, the bringing forth a perfect *foetus*, or child, from its mother's womb, whether it be alive, or dead. See **FOETUS**.

In order to attain the knowledge of difficult childbirths, it is necessary to form a just idea of those that are natural. The time of the natural birth is, from the 15th day of the ninth month, to the end of the 10th of the same: yet some women affirm it may be sooner, or later. Hoffman says, the usual time is nine solar months; and Junker, that excretions from the uterus being by women referred to certain lunar phases, they reckon their going with child by the weeks, and that they usually exclude the *foetus* forty weeks from the time of their being with child, commonly on that very day they were used to have their menses.

The signs of an approaching delivery, are a remarkable descent of the womb, and a subsidence of the belly; the head of the *foetus* falls down to the orifice of the womb, and presses upon it. See plate **LXVIII. n° 1.** The orifice of the womb dilates by the weight; and the chorion and amnios, being driven forward with the waters they contain, form a kind of pouch, or bladder, at the said orifice; which should be suffered to break of itself, or, at least, it should not be burst

till the woman is in labour. There is a flux of a whitish matter from the said orifice: pains which extend from the loins and groin towards the genital parts: there is a frequent desire to make water, or to go to stool; or a continual tenesmus: a flux of the waters from the membranes which contain the child immediately before the birth, or more early: a trembling of the lower joints: sometimes the head aches, and the face looks intensely red.

The infant gradually advances, the above protuberance continually enlarging the passage, that the crown of the head may be felt; the birth is then advanced one third; and the midwife may now assist the exclusion. When the infant is advanced forward, as far as his ears, he is said to be in the passage. If the membranes are not already burst, they may now be opened, and the waters by their effusion, will render the vagina slippery, and promote the expulsion of the infant. When the child is born, the midwife should lay him on her knees, so as to give issue to the waters from the mouth, if any has been imbibed: soon after, the placenta appears of itself, if not attached to the uterus: if otherwise, the midwife must separate it gently, by introducing her hand. The navel-string must now be cut, having first made a ligature as well on the child's side as on the mother's, to prevent a hæmorrhage. The midwife, at first, having asked a few questions, ought to examine, by the touch, with the fore and middle finger, introducing them from time to time, to know the state of the uterus; and, as the child advances, she must relax the vagina by some oily remedy. The mother should regulate her throws, and use her efforts all at once, not divide them, especially when the head is advanced, that the shoulders may immediately follow, and the child escape the danger of strangling.

After the child is born, and the after-birth brought away, let a warm linnen cloth be applied to the parts, but not so as to hinder the flowing of the lochia. An hour after, let the mother take a little oil of sweet almonds, to ease the after-pains, and let a cataplasm of the oil of sweet almonds ʒij. and two or three new laid eggs be boiled together, and laid to the parts, renewing it every six hours, for two days: fifteen days after

after the birth, the parts may be bathed with an astringent decoction of red roses, balsamifines, or nut-galls, in red wine, in order to brace them. If the labour is long and difficult, it will be proper to bleed, to prevent inflammations, and to give a little Alicant-wine, or with the addition of Cinnamon-water, or confectio alkermes, not forgetting an oily clyster.

*A difficult DELIVERY* may be caused by the mother, the midwife, or the foetus. The fault is in the mother, if, when the orifice of the womb is open, and the child rightly placed, she has not strength to expel the foetus, especially if the waters are come away, and the pains cease: or when the mother will not exert herself; or there is a natural fault in the genital parts. In a defect of strength, or pains, all else being right, a draught of generous wine should be given, with cinnamon and mace, again and again, if the work does not go forward. If there wants a greater stimulus, borax, cinnamon, or myrrh, may be given, with a proper drink, which must be repeated in an hour or two, if occasion requires. But the abuse of forcing medicines is dangerous: stimulating clysters may be injected now and then, especially if the woman is costive. The midwife should also press back the os coccygis, which tends to excite the pains, and to ease the labour. If the parts are overstrait, as in the first birth, especially if the woman is not young, emollient liniments are to be used, and the parts must be anointed with fresh butter, or oil, and to be dilated gently with the fingers. If there is a tumor, caruncle, or membrane, opposing the birth, a surgeon's assistance is required.

The midwife is in fault, when she hastens the labour before the time, when there is no true pains, when the orifice of the uterus is not open, which alone distinguishes the true pains from false: the true time of birth must be waited for: the woman must be composed, and her spirits kept up with comfortable liquors.

If the fault is with the foetus; and the head too large, or the shape monstrous, or the situation preternatural, then forcing medicines are fruitless and noxious; and the foetus is brought forth by the feet, by a skilful hand, or the instrument called embryulcus, (ibid. n° 10, 11.) whether alive or dead. See EMBRYULCUS.

If the feet present first (ibid. n° 2.) the midwife must be wary, lest there be twins, and lest she should take a foot of each: the feet must be wrapped in a dry napkin, and the child must be drawn gently, till the waste is in the orifice of the uterus: then the infant's hands should be drawn close by the sides; and if the nose be towards the os pubis, it should be turned towards the coccyx, to prevent an obstacle. Then, the orifice must be dilated with the fingers, and the woman's throws should assist the midwife's efforts to educe the child. If the chin is embarrassed, the midwife must disengage it, by putting her finger into the mouth, in order to turn it to advantage.

If the infant's head presents across, (ibid. n° 3.) it must be put back, and gently turned to its natural situation; and if the shoulder presents, the same art must be used, (ibid. n° 4.) If the belly, hip, or thigh, appears first, (ibid. n° 5.) the child must be extracted by the feet, and the mother must lie horizontally on her back. If one or both hands are directed upwards, and lie close to the head, (ibid. n° 6.) the case is not so bad as some apprehend, for they will keep the orifice equally dilated, till the head passes, and prevents strangling. If one hand, or one foot appears, they must be returned, and the infant brought forth by the head in the former case, and by the feet in the latter. (n° 7, and 8.)

If the infant is dead, there is generally a collapion of the abdomen; the breasts are flaccid; the infant bears on the lower part of the pelvis; and the child, upon motion, rolls like a lump of lead. The bones of the skull are wrapped over one another; an ichorous lymphatic sanies flows from the uterus; the mother is subject to fainting. There is no pulsation in the navel string; it is soft and indolent to the touch, and absolutely deprived of motion. If the placenta comes first, and is hot, the child is alive. Above all, if any part of the infant's body appears, and is full of small vesicles livid, soft, and brittle, it is not only dead, but beginning to putrify. In these cases he must be extracted by the feet, and if it cannot be done otherwise, with an instrument; but a man midwife's assistance must not be neglected.

When the foetus dies before the time of birth, and the membranes continue whole, it will not putrify: therefore the work

Fig. 1. DELIVERY.

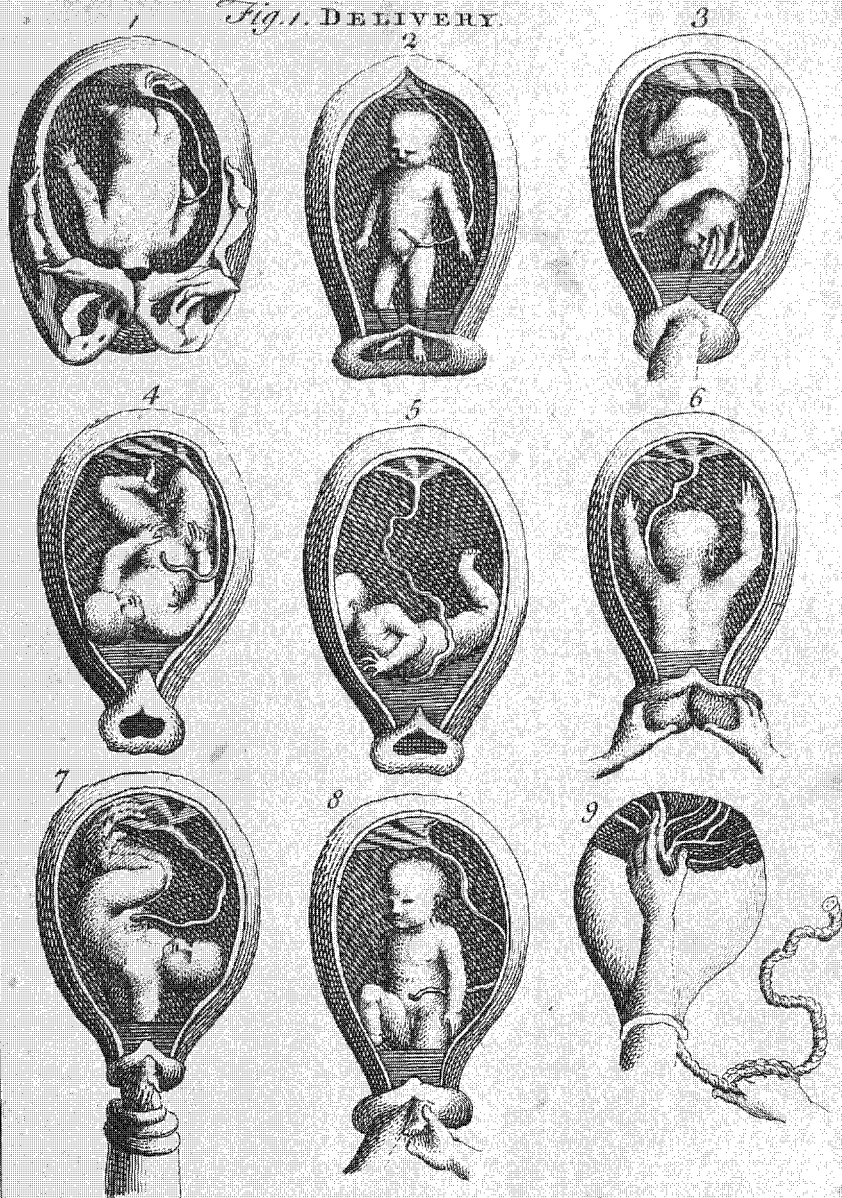
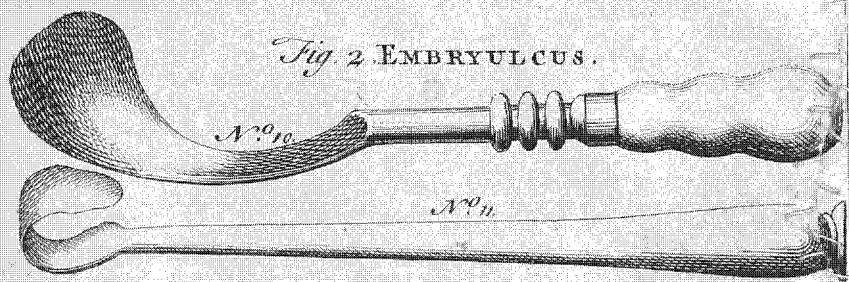


Fig. 2. EMBRYULCUS.



J. Jefferys sculp.





work must be left to nature, for birth-pains will at length come on spontaneously.

If the navel-string appears first, and is compressed soon after by the head of the infant, its life is in danger, and the remedy is to return the infant, and reduce the cord, till the head fills the orifice: but if this cannot be done, the woman must be put in a suitable posture, and the child must be extracted by the feet.

When the placenta presents itself, which is known by its spongy, soft, texture, and the great quantity of blood flowing at the same time, it requires speedy assistance. If the membranes are entire, they should be broke; the placenta and membranes should be reduced into the uterus, and the child be extracted by the feet; which is more easily performed in the membranes, than in the uterus, and put into a proper situation: but if the placenta is disengaged from its membranes, and these are broke, and the placenta, or both, appear before the infant, they may be brought away first, and the infant immediately afterwards.

When there is a great flux of blood from outward accidents, the infant should be immediately delivered by art, though the mother is not in true labour. If the uterus is opened, and the vagina relaxed, as in this case they commonly are, the child must be extracted by the feet; if not, they must be mollified with fresh oil, and the infant delivered as before.

After all laborious births, the woman is generally weak, and apt to faint: therefore, her spirits should be kept up by a glass of hot wine, or analeptic water, which must be repeated as oft as there is occasion.

If after the child is born, the placenta does not soon follow, and it adheres to the womb, the woman is not to change her posture immediately, but the midwife's hand is to be introduced into the womb, as far as the placenta, taking the navel-string for a guide; and taking hold of it, she is to move it gently to and fro, in order to loosen and extract it. (ibid. n<sup>o</sup> 9.) If it adheres too closely, it is not to be pulled forcibly, or broken: it will be best to wait half an hour, keeping the hand in the uterus, for fear of its closing, till it comes away of itself, or may be separated without force. If, through the unskilfulness of the midwife, the orifice of the womb closes, before it is come away, aloetic pills must be taken

every evening. If it putrefies, the patient dies, or falls into dangerous fevers. See the article PLACENTA.

After delivery, the woman should be put into bed, and a folded sheet put under her hips, in order to receive the lochia. See the article LOCHIA.

Warm linnen should be applied to the genital parts, to keep out the air, and a compress, dipped in warm wine, should be applied to the belly, but not too tight.

If there are violent pains after delivery, they generally proceed from the after-birth's being retained, or part of it; from blood clotted, or concreted, in the uterus; from hard labour; from a defect in the flux of the lochia; or from wind, especially if the woman has not been swathed in a proper way. In this case, hot diluents are proper, or an infusion of camomile flowers, drank as tea, or broths with caraway seeds; or wormwood, or camomile flowers; or thin orange peel 3j. or a bitter tincture in a proper infusion, taken hot. An ounce or two of oil of sweet almonds, taken in a hot vehicle, is excellent.

**DELLY**, the capital of a province of the same name, and at present of all the hither India: east long. 79°. and north lat. 28°.

It is a large and populous city, ten miles in circumference.

**DELOS**, the principal of the Cyclades-islands, in the Archipelago: east long. 25° 50', and north lat. 37°, 26'.

**DELPHIN**, or **DOLPHIN**. See the article DOLPHIN.

**DELPHINIUM**, **LARK'S SPUR**, in botany, a genus of the *polyandria-trigynia* class of plants, the corolla of which consists of five unequal petals, disposed circularly; of these the upper one is anteriorly more obtuse than the others, and is emarginated, and extended behind into a tubulated horn, which is straight, long, and obtuse; the others are of an ovato-lanceolated figure, patent and nearly equal: the fruit consists of one or three capsules, of an ovato-tubulated figure, straight, composed of a single valve, and opening inwards: the seeds are numerous and angular: these seeds called *staphisagria*, or *stavesacre*, in the shops, are used to destroy vermin in childrens heads. See plate LXIX. fig. 1.

**DELPHINUS**, in ichthyology, a genus of fishes, of the order of the *plagiuri*, the characters of which are, that they have

have teeth in each jaw, that the fistula is situated in the middle of the head, and that the back is pinnated, or furnished with fins.

To this genus belong the dolphin, the porpoise, and the grampus, or north caper. See the articles DOLPHIN, &c.

**DELPHINUS**, in astronomy, a constellation of the northern hemisphere, whose stars in Ptolemy's and Tycho's catalogues are ten, and in Mr. Flamsteed's eighteen.

**DELSBERG**, or **DESBERG**, a town of Switzerland, about seventeen miles south-west of Basil.

**DELTOIDES**, in anatomy, a thick triangular muscle of the arm, being one of the three elevators. See the article **ELEVATOR**.

This muscle arises from the clavicle, and the acromion and spine of the scapula; and terminates, at four fingers breadth below the neck of the humerus. See the article **HUMERUS**.

**DELUGE**, *deluvium*, an inundation, or overflowing of the earth, either wholly, or in part, by water.

We have several deluges recorded in history, as that of Ogyges, which overflowed almost all Attica, and that of Deucalion, which drowned all Thessaly, in Greece: but the most memorable was that called the universal deluge, or Noah's flood, which overflowed and destroyed the whole earth, and out of which only Noah, and those with him in the ark, escaped.

Men have been very solicitous to account for this catastrophe philosophically, and to discover from whence such an amazing quantity of water could come, as were necessary to cover all our globe, to the height of fifteen cubits, above the highest hills: for to that height Moses expressly saith, *Gen. vii. 20.* "The waters prevailed." Some have ventured to deny there were any mountains at all before the flood, though he expressly mentions them as a standard for the height of the water. Others have denied the universality of the deluge, though the words of the text be, "That all the hills over the whole earth were covered." Others have had recourse to the shifting of the earth's center of gravity, and therefore, will have all parts drowned successively; and our famous theorist, Dr. Burnet, fancies an earth made on purpose to be drowned at that time, which being in form of an

orbicular crust on the face of the sea, as we now call it, (for he says, there was none before the deluge) fell down into the water, and so drowned its inhabitants.

But the holy scriptures tell us, that the waters of the deluge came from two funds, "the great deep below," and the "rains above." Again, when we look to the internal parts of the earth, even to the greatest depth men have ever reached, we find that the body of the terrestrial globe is composed of strata, or layers, lying over one another, which appear to be sediments of a flood: besides, in the bodies of these strata, though never so solid, nay, even inclosed within the solidity of the firmest flints, marble, stone, &c. we find a prodigious variety of the exuviae, or remains of fishes, such as their shells, teeth, &c. as well marine ones, as those which live in lakes and rivers; and from a due observation of these, and repeated considerations upon them, it was, that the learned Dr. Woodward founded what he delivers upon this subject, which therefore is not so much a theory of the earth, as necessary deductions, and unavoidable consequences, drawn from the matters of fact, as they are laid down in the second part of his natural history of the earth.

1. That these marine bodies, and the other spoils of fresh water fishes, were borne forth out of the sea by the universal deluge, and on return of the water back again from off the earth, they were left behind on land.

2. That during the time of the deluge, all the stone and marble of the antediluvian earth, all the metals in it, all the mineral concretions, and in a word, all fossils whatever, that had before attained any solidity, were totally dissolved; their constituent corpuscles disjoined, and their cohesion perfectly ceased; and that the said corpuscles, together with the corpuscles of those which were not before solid, such as sand, earth, and the like; as also, all animal bodies, teeth, shells, vegetables, in short, all bodies whatever, that were either upon the earth, or that constituted the mass, if not quite down to the abyss, yet to the greatest depths we ever dig, were assumed up promiscuously into the water, and sustained therein; so that the water and these bodies made up one common mass.

3. That at length, all the mass that was thus borne up in the water, was again pre-

precipitated, and subsided toward the bottom, and that this subsidence happened generally according to the laws of gravity. See the article GRAVITY.

That the matter subsiding thus, formed the strata of stone, earth, marble, coal, &c. of which strata the terrestrial globe, or, at least, as much of it as hath been displayed to human view, doth mainly consist.

4. That the strata of marble, &c. attained their solidity as soon as the sand, or other matter, whereof they consist, was arrived at the bottom, and well settled there; and that all those strata which are solid at this day, have been so ever since that time.

5. That these strata were originally parallel, plane, and regular, and consequently rendered the surface of the earth even and spherical; that they were contiguous, and not broken and interrupted as we find them now; and that the water lay then upon them, constituting a fluid sphere, environing all the globe round.

6. That after some time, by the force of an agent seated within the earth, those strata were broken on all sides of the globe; that they were dislocated, and their situation varied; from whence these elevations and depressions on the surface of the globe, as the mountains, vallies, and other inequalities.

And afterwards, he concludes from his observations,

1. That Noah's deluge was quite universal, covering the whole earth, even the highest mountains quite round the globe.

2. That, at the time of the deluge, the water of the ocean was first brought out on the earth, and immediately succeeded by that of the abyss.

3. That, upon the disruption of the strata, or the elevation of some, and the depression of others, towards the end of the deluge, this mass of water fell back towards the lowest parts of the earth, into lakes, and other cavities, into the channel of the ocean, and through the fissures, by which this communicates with the ocean, in the abyss which it filled, till it came to an equilibrium with the ocean.

4. That the deluge commenced in the spring season, the waters coming forth upon the earth in the month which we call May.

5. That the deluge did not happen, from an accidental concurrence of natural causes;

but that many things then happened, which never could possibly happen, without the assistance of a supernatural power.

Mr. Whiston, on the contrary, in his new theory of the earth, supposes the deluge began on the 18th of November, in the 2365 year of the Julian period, that is, 2349 years before the Christian æra; that a comet descending towards its perihelion, in the plane of the ecliptic, passed quite near the globe of the earth, the very same day that the deluge began; he ascribes to the universal deluge all the changes and alterations that have happened in the surface and inside of the globe: he adopts the hypothesis of Dr. Woodward, and indiscriminately makes use of all the observations of this author, with regard to the present state of the globe.

The terrestrial globe having once met with the tail of the comet, consisting of a transparent fog, or aqueous atmosphere, it must, in passing through it, appropriate to itself some part of the matter it contained. All that was found within the sphere of attraction of the globe, must have fallen upon the earth, and that in form of rain, since this tail partly consisted of aqueous vapours. This tail being "the cataraacts of heaven that were "opened," the rain may be made as plentiful as one pleases, even to occasion an universal deluge, the waters of which would easily cover the highest mountains. However, Mr. Whiston does not attribute the whole deluge to these waters only, for, agreeably to scripture, he affirms that the earth, upon the approach of the comet, would no doubt feel the force of its attraction; so that the fluid, contained in the great abyss, would be agitated by so violent a flux and reflux, that the superficial crust of the earth could not resist it, but be broken in several places, and the internal waters diffused over the surface, "and the fountains of the great deep broken up."

Mr. Whiston, to dispose of all this water, supposes, that as soon as the earth in continuing its course, had got some way from the comet, the effects of its attraction, the flux and reflux ceased in the great abyss, and then the superior waters were violently precipitated through the same passages by which they came out; the great abyss swallowed up all the superfluous waters, and its cavity was found capable enough to

receive not only the waters which it had already contained, but also all those which the tail of the comet had left behind it; since during the time of its agitation, and the bursting of its crust, it had enlarged the space by breaking down, on all hands, the earth that environed it. It was, in like manner at this time, that the earth, which till then was spherical, became elliptic, occasioned not only by the effect of the centrifugal force caused by its diurnal revolution, but likewise by the action of the comet; and that because the earth, in passing through the tail of the comet, was situated in such a manner, that it presented its equatorial parts to this body; and because the force of the comet's attraction, concurring with this centrifugal force of the earth, took away those parts of the equator with so much the more facility, as the crust was broken and disjoined in a vast many places; and because the action of the flux and reflux of the abyss made a more violent impression upon the parts under the equator, than any where else.

Dr. Halley resolves the deluge into the shock of a comet, or some other such transient body: the great agitation that must have been occasioned by it in the sea, he observes, would be sufficient to account for all those strange appearances of heaping vast quantities of earth, and high cliffs upon the beds of shells, which once were the bottom of the sea, and raising up mountains, where none were before: such a shock as this, impelling the solid parts, would occasion the waters, and all fluid substances that were unconfined, as the sea is, to run violently with an impetus toward that part of the globe where the blow was received, and that with force sufficient to take with it the very bottom of the ocean, and would carry it upon land.

There are various other systems of the universal deluge, several of which may be seen in *Monf. Buffon's Natural History*, Tom. 1.

**DELVIN**, among the miners of Cornwall, a kind of slate more usually called killas. See the article **KILLAS**.

**DEMAIN**, or **DEMESNE**, in its common acceptation, is used for the lands round a manor-house, occupied by the lord. See the article **MANOR**.

**DEMAIN**, or **DEMESNE**, in law, is commonly understood to be the lord's chief manour-place, with the lands thereto belonging, which he and his ancestors have

time out of mind kept in their own manual occupation, for the maintenance of themselves and their families. See the article **MANOR**.

**DEMAIN** denotes also all the parts of any manor not in the hands of freeholders. And it is frequently used for a distinction between these lands, &c. that the lord of the manor has in his own hands, or of his lessee demised at a rack rent; or such other land appertaining to the manor, which belongs to free or copyholders.

**DEMAIN** is sometimes taken in a more special sense, as opposite to frank-fee; such lands as were in the possession of Edward the confessor, being called antient demesne, and all others frank-fee. In England, no private person has any demesnes, according to the simple acceptation of the word, because there is no land but what depends mediately or immediately upon the crown, as of some honour belonging to it, and not granted in fee to any inferior person; wherefore when a person in pleading would signify the land to be his own, he says, that he is seized thereof in his demain as of fee; by which it appears, that tho' his land be to him and his heirs for ever, yet it is not true demesne, but depending upon a superior lord, and is held by rent or service.

**DEMAND**, in law, the calling upon a person for any thing that is due.

There are two kinds of demands, the one in deed, and the other in law. And these are again divided into three sorts, one in writing, without speaking, as in every writ of præcipe; one other without writing, being a verbal demand of the person who is to perform something; and another made without either words or writing, which is termed a demand in law, as in cases of entries on lands, &c. And, as an entry upon land and taking distress for rent, are a demand in law of the land and rent, so the bringing an action of debt for money due on a bond, is a demand in law of the debt.

A demand is to be legal, and made in such a manner as the law directs; if for rent reserved on a lease of a messuage and lands, it ought to be made at the fore door of the house; and of land, on the most public part thereof. If a lessor or landlord in demanding of rent to re-enter, demands one penny more or less than is actually due to him, or does not shew the certainty of the rent, the day of its payment,



Fig. 1. DELPHINIUM, LARK'S SPUR.

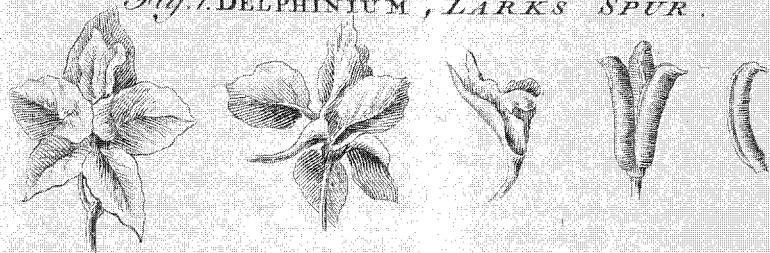


Fig. 2. DERMESTES.

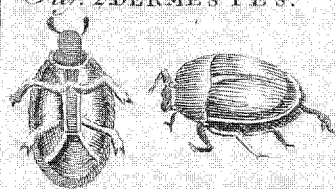


Fig. 3. DEMI-CROSS.

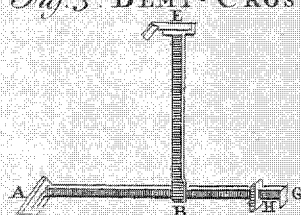


Fig. 4. DENTARIA.

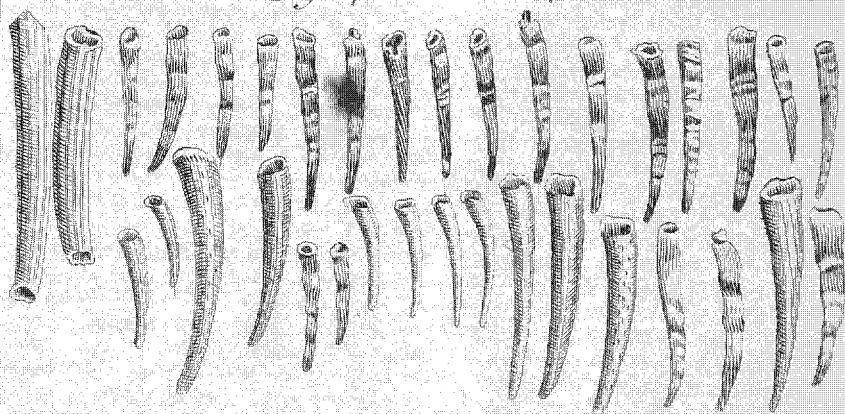


Fig. 5. DESIGNING.

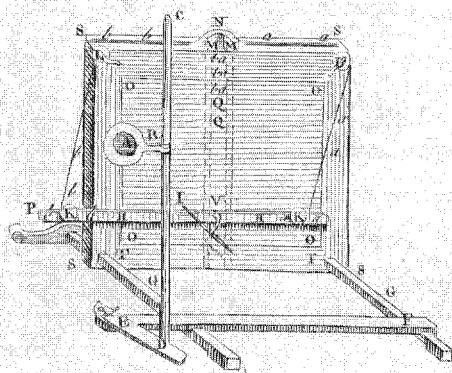
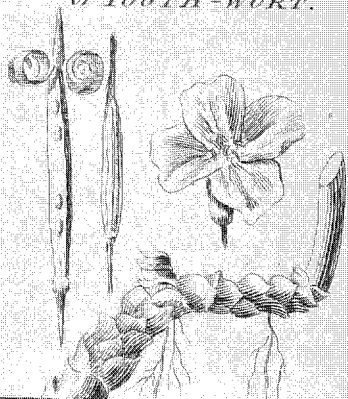


Fig. 6. DENTARIA, or TOOTH-WORT.



ment, and when due, it will not be a good demand. Debts and claims are to be demanded in time by the statute of limitations, or they will be lost by law.

**DEMANDANT**, in law, is the plaintiff in all real actions, wherein land, &c. is demanded; for these actions are by demands, as personal actions are by plaints.

**DEMARCHUS**, *δημαρχος*, in antiquity, the principal magistrate of the city Neapolis; also a magistrate who had the government of one of the districts of Attica, answering in some measure to our sheriffs.

**DEMEMBRE**, in heraldry, is said of dismembered animals, or those with their limbs cut off.

**DEMER**, a river in the austrian Netherlands, on which the city of Mechlin stands.

**DEMESNE**, the same with demain. See the article **DEMAIN**.

**DEMETRIA**, a festival celebrated by the Greeks in honour of Ceres, called *δημητρία*; wherein it was usual for the devotees to lash themselves.

**DEMETRIOWITZ**, a city of the dutchy of Smolensko, in the russian empire, situated upon the river Ugra, in  $37^{\circ}$  east long. and  $52^{\circ} 30'$  north lat.

**DEMI**, a word used in composition with other words to signify half. In words borrowed from the Latin we use semi. See the article **SEMI**.

**DEMI-BASTION**, a fortification having only one face and one flank. See the article **BASTION**.

**DEMI-CANNON lowest**, the name of a piece of ordnance generally about six inches bore, 5400 pound weight, ten or eleven feet long, and carrying a shot of about thirty pound weight. It carries point blank 156 paces.

**DEMI-CANNON ordinary**, is  $6\frac{1}{2}$  inches bore, 12 feet long, and weighs 5600 pound. It carries a shot of  $6\frac{3}{4}$  inches in diameter, whose weight is 32 pounds, and shoots point blank 162 paces.

**DEMI-CANNON of the longest size**, is  $6\frac{3}{4}$  inches bore, 12 feet long, and weighs 6000 pounds weight. It shoots point blank 180 paces.

**DEMI-CROSS**, an instrument used by the Dutch to take the sun's altitude, or that of a star, at sea. It consists of a staff AG (See plate LXIX. fig. 3.) divided into a line of tangents, and a cross piece or transum BE. It is furnished with three vanes; a horizon vane, at A; a sight vane, at H; and the shade vane, at E.

To take the sun's altitude by this instrument, hold it with the cross piece BE as upright as you can; and looking thro' the sight vane at H, observe the horizon thro' the slit in the horizon vane A, and slide the cross piece to and fro till the shade of the vane at E fall likewise upon the slit of the horizon vane A; then are the degrees cut on the staff AG, by the edge of the cross piece BE, the altitude of the sun required. But to find the height of a star, you must remove the horizon vane A, and put it on the end G, and transfer the sight vane H to A; then holding the instrument upright, as before, observe the horizon through the sight vane and horizon vane, and the star through the sight vane and shade vane, and then the transum will cut the degrees of the star's altitude on the staff AG; allowing about eight or ten minutes for your height above the level of the water. Instead of the demi-cross, we use the cross staff, or fore-staff. See **FORE-STAFF**.

**DEMI-CULVERIN**, a piece of ordnance usually  $4\frac{1}{2}$  inches bore, 2700 pound weight, ten feet long, and carrying point blank 175 paces.

**DEMI-CULVERIN of the least size**, is  $4\frac{1}{4}$  inches bore, 10 feet long, and 2000 pounds weight. It carries a ball of 4 inches diameter, and of 9 pounds weight, and its level range is 174 paces.

**DEMI-CULVERIN of the largest sort**, is  $4\frac{3}{4}$  inches bore,  $10\frac{1}{2}$  feet long, and weighs 3000 pounds weight. It carries a ball  $4\frac{1}{2}$  inches diameter, weighing 12 pounds 11 ounces, point blank 178 paces.

**DEMIDITONE**, in music, is the same with a third minor. See the article **THIRD**.

**DEMI-HAQUE**. See **HARQUEBUSS**.

**DEMI-GOD**, &c. See **GOD**, **HERO**; &c.

**DEMI-GORGE**, in fortification, is that part of the polygon which remains after the flank is raised, and goes from the curtain to the angle of the polygon. It is half of the vacant space or entrance into a bastion. See the article **GORGE**.

**DEMI-LUNE, half moon**, in fortification, an outwork consisting of two faces and two little flanks, frequently built before the angle of a bastion, and sometimes also before the curtain, tho' now much disused.

**DEMI-QUAVER**, a note in music, two of which are equal to a quaver. See the articles **SEMI-QUAVER** and **QUAVER**.

**DEMI-SEMI-QUAVER**, in music, the shortest note, two of them being equal to a semi-quaver. See the articles **SEMI-QUAVER**, **CHARACTER**, &c.

**DEMISE**, in law, is applied to an estate either in fee, for term of life or years, tho' most usually the latter. The king's death in law is termed the demise of the king, which does not discontinue any writ or process, nor determine any commission civil or military, nor a parliament till after six months.

**DEMISE** and **REDEMISE**, a conveyance where there are mutual leases made from one to another of the same land, or something out of it.

**DEMOCRACY**, the same with a popular government, wherein the supreme power is lodged in the hands of the people: such were Rome and Athens of old; but as to our modern republics, Basil only excepted, their government comes nearer to aristocracy than democracy.

**DEMOISELLE**, in ornithology, a bird of the crane-kind, something less than a heron, known also by the name of the dancing bird, on account of its frequent leaping and turning round, and varying the motion of its head at the same time. Immediately from behind each eye, springs forth a tuft of long, soft, white feathers, which tend backwards in a very graceful manner, and wave with the least air. The fore part of the neck, on the contrary, is covered with soft, long, and slender black feathers, which fall on the breast in a very pretty manner, sometimes close, and at other times detached like a lady's tippet.

**DEMONSTRABLE**, a term used in the schools, to signify that a thing may be clearly proved. Thus it is demonstrable, that the three angles of a triangle, are equal to two right ones.

**DEMONSTRATION**, in logic, a series of syllogisms, all whose premisses are either definitions, self-evident truths, or propositions already established.

The knowledge acquired by demonstration, tho' it be certain, is not so clear and evident as intuitive knowledge. It requires pains and attention, and steady application of mind, to discover the agreement or disagreement of the ideas it considers; and there must be a progression by steps and degrees, before the mind can in this way arrive at certainty. Before demonstration there was a doubt, which, in intuitive knowledge, cannot happen to the mind that has its faculty of perception left to a degree capable of distinct ideas. In every step that reason makes in demonstrative knowledge, there is an intuitive knowledge of that agree-

ment or disagreement it seeks with the next intermediate idea, which it uses as a proof; for if it were not so, that yet would need a proof, since without the perception of such agreement or disagreement, there is no knowledge produced. This intuitive perception of the agreement or disagreement of the intermediate ideas in each step and progression of the demonstration, must be exactly carried in the mind; and a man must be sure that no part is left out: hence because in long deductions the memory cannot easily retain each step, this knowledge becomes more imperfect than intuitive; and men often embrace falsehoods for demonstrations. See **KNOWLEDGE** and **INTUITION**.

It has been generally taken for granted, that mathematics alone are capable of demonstration. But to have such an agreement or disagreement as may be intuitively perceived being not the privilege of the ideas of number, extension and figure alone, it may possibly be the want of due method and application in us, and not of sufficient evidence in things, that demonstration has been thought to have so little to do in other parts of knowledge. For wherever the mind can perceive the agreement or disagreement of any two ideas by an intuitive perception of the agreement or disagreement they have with any intermediate ideas, there the mind is capable of demonstration, which is not limited to the ideas of figure, number, extension, or their modes. There are two things required in right demonstration, first, that every proposition of which it consists, considered separately, be true. Secondly, that the consequence drawn from other foreign things, necessarily flow from them; or that all the consequences be contained in the antecedents or premisses.

Demonstration is distinguished, 1. Into direct, called also offensive, demonstration, when beginning with definitions, self-evident propositions, or known and allowed truths, we form a train of syllogisms, and combine them in an orderly manner, continuing the series thro' a variety of successive steps, until at last we arrive at a syllogism, whose conclusion is the proposition to be demonstrated. 2. Indirect, or, as it is sometimes called, apagogical demonstration, when we assume a proposition which directly contradicts that we mean to demonstrate; and thence by a continued train of reasoning, in the way of a direct demonstration, deduce



deduce some absurdity or manifest untruth. For hereupon we conclude, that the proposition assumed was false; and thence again, by an immediate consequence, that the proposition to be demonstrated is true. Thus Euclid being to demonstrate, *that circles which touch one another inwardly have not the same center*, assumes the direct contrary to this, *viz. that they have the same center*: and thence by an evident train of reasoning proves, *that a part is equal to the whole*. The supposition, therefore, leading to this absurdity he concludes to be false, *that circles touching one another inwardly have the same center*; and thence again immediately infers *that they have not the same center*. This is also called *reductio ad impossibile*, and *ad absurdum*.

3. Geometrical demonstration, that framed of reasonings drawn from the elements of Euclid. 4. Mechanical demonstration, that, the reasonings of which are drawn from the rules of mechanics. 5. Demonstration a priori, that by which the effect is demonstrated from its cause either next or remote, as when we prove the existence of light by the existence of the sun. 6. Demonstration a posteriori, when we demonstrate the cause from the effect; as when from the existence of light, we demonstrate the existence of the sun.

The schoolmen make two kinds of demonstration, the one *dém,* or *propter quod*, in which an effect is proved by the next cause. As when it is proved that the moon is eclipsed, on account of the interposition of the earth between the sun and moon. The other *èri,* or *quia*, wherein the cause is proved from an effect, as, that fire is hot because it burns; or when an effect is demonstrated by a remote cause, as when it is proved that plants do not breathe, because they are not animals.

**DEMONSTRATIVE**, in rhetoric, one of the kinds of eloquence, *viz.* that which obtains in the composition of panegyrics, invectives, &c. See the article RHETORIC.

**DEMONSTRATIVE**, in grammar, a term given to such pronouns, as serve to indicate or point out a thing. Of this number are *hic, hæc, hoc*, among the Latins; and *this, that, these, those*, in English. See the article PRONOUN.

**DEMULCENTS**, among physicians, medicines good against acrimonious humours. Such are the roots of marsh-mal-

lows, of white lillies, of liquorice, and of viper grass, the five emollient herbs, &c. See the article EMOLLIENT.

**DEMURRAGE**, in commerce, an allowance made to the master of a ship by the merchants, for staying in a port longer than the time first appointed for his departure.

**DEMURRER**, in law, a stop put to any action upon some point of difficulty which must be determined by the court, before any further proceedings can be had in the suit. Demurrers are either general, without shewing any particular cause; or special, where the causes of it are particularly assigned; and one may not pray the judgment of the court on an insufficient declaration or plea, otherwise than by demurrer, when the matter comes judicially before them. In pleadings, if a matter is insufficiently alledged, that the court cannot give judgment thereon, a general demurrer will suffice, and so for want of substance in any plea, &c. But if there be a want of form, it is required that there be a special demurrer.

**DEMURRER to evidence**, is where a question of law arises thereon, as if the plaintiff in a suit gives in evidence any records, deeds, writings, &c. upon which a law question arises, and the defendant offers to demur upon it, then the plaintiff must join in such demurrer, or wave his evidence.

**DEMURRER to indictments**, is when a criminal joins issue upon a point of law in an indictment or appeal; allowing the fact as laid to be true. And if the indictment, or appeal, prove good in the opinion of the judges by whom the demurrer is to be tried, and not by the inquest, they proceed to judgment and execution, as if the party had been convicted by confession or verdict.

**DEN**, a syllable which added to the names of places shews them to be situated in vallies or near woods, as Tenterden.

**DEN and STROND**, in law, was antiently a liberty for ships to run or come ashore.

**DENARIATE of LAND**, *denarius terra*, in old law-books, signifies as much as was worth a penny by the year.

**DENARIUS**, in roman antiquity, the chief silver-coin among the Romans, worth in our money about seven-pence three farthings. As a weight, it was the seventh part of a roman ounce. See the articles COIN and WEIGHT.

**DENARIUS** is also used in our law-books for an english-penny.

**DENARIUS DEI**, GOD'S PENNY, denotes earnest-money, and is so called because in antient times it was given to the church or the poor.

**DENARIUS tertius comitatus**, a third part of the profits of county-courts. When these courts had superior jurisdictions, before others were erected, two parts of the profits went to the king, and a third part to the earl of the county.

**DENARII de caritate**, were customary oblations made to cathedral churches charged upon parish priests, though at first they were but a gift of charity.

**DENATES**, a term used by some for penates. See the article **PENATES**.

**DENBY**, the capital of Denbysshire, in north Wales: west long.  $3^{\circ} 30'$ , and north lat.  $53^{\circ} 15'$ .

It sends only one member to parliament.

**DENCHE'**, in heraldry, the same with danché. See the article **DANCHE'**.

**DENDERMOND**, a fortified town of Flanders, situated at the confluence of the rivers Scheld and Dender, twelve miles east of Ghent: east long.  $3^{\circ} 50'$ , and north lat.  $51^{\circ} 10'$ .

**DENDRACHATES**, in natural history, the name used by the antients for an extremely elegant and beautiful species of agate, the ground of which is whitish, variegated with veins of a brighter white. These veins are beautifully disposed in a number of various figures, but generally in many concentric irregular circles, drawn round one or more points. It is common also, in various parts of this stone, to find very beautiful delineations of trees, mosses, sea-plants, and the like, so elegantly expressed, that many have erroneously taken them for real plants included in the substance of the stone; whence the name dendrachates. See the article **AGAT**.

**DENDRANATOMY**; a term used by some for a description of the various parts of trees, as root, trunk, branch, bark, wood, pith, flower, fruit, &c. See the articles **ROOT**, **TRUNK**, **BRANCH**, &c.

**DENDRITÆ**, in natural history, a name given to those species of septariæ which have representations of trees, &c. See the article **SEPTARIÆ**.

**DENDROPHORIA**, in antiquity, the carrying of boughs or branches of trees, a religious ceremony so called, because certain priests called from thence dendrophori, tree-bearers, marched in procession, carrying the branches of trees in their hands in honour of some god, as Bacchus,

Cybele, Sylvanus, &c. The college of the dendrophori is often mentioned in antient marbles; and we frequently see in basso relievos the bacchanals represented as men carrying little shrubs or branches of trees.

Critics are at a loss to assign the office of the dendrophori who attend the roman army. Some hold that they fashioned the wood for the tents; others, that they provided the wood necessary for the machines of war; and others, that they were the same with the dendrophori of the feasts and sacrifices.

**DENEB**, an arabic term signifying tail, used by astronomers to denote several fixed stars. Thus deneb elecet, signifies the bright star in the lion's tail. Deneb adigege, that in the swan's tail, &c.

**DENEB**, or **ALDENEB ALCHAIL**, in the writings of the arabian physicians, denotes a plant called equisetum or horsetail. See the article **EQUISETUM**.

**DENIER**, a small french copper-coin, of which twelve make a sol.

There were two kinds of deniers, the one tournois, the other paris, whereof the latter was worth a fourth part more than the former. See the article **COIN**.

**DENIZEN**, in law, an alien made a subject by the king's letters patent, otherwise called donaison, because his legitimation proceeds *ex donatione regis*, from the king's gift. A denizen is enabled in several respects to act as natural subjects do, *viz.* to purchase and possess lands, and enjoy any office or dignity; yet it is short of naturalization, for a stranger, when naturalized, may inherit lands by descent, which a denizen cannot do. If a denizen purchase lands, his issue that are born afterwards may inherit them, but those he had before shall not; and as a denizen may purchase, so he may take lands by devise.

**DENMARK**, a kingdom situated between  $8^{\circ}$  and  $13^{\circ}$  of east longitude, and between  $54^{\circ}$  and  $58^{\circ}$  of north latitude: it comprehends the peninsula of Jutland, and the islands of Zeland, Funen, &c. To the king of Denmark likewise belong Norway, Iceland, and the dutchy of Holstein.

**DENNIS**, or **St. DENNIS**, a town of France four miles north of Paris, where the kings of France are interred.

**DENOMINATION**, a name imposed on any thing, usually expressing some predominant quality. Hence, as the qualities and forms of things are either inter-

nal or external, denomination becomes,  
 1. Internal, which is that founded on the intrinsic form. Thus Peter is denominated learned, on account of his learning, which is something internal. 2. External denomination, that founded on an external form. Thus, a wall is said to be seen and known, from the vision and cognition employed upon it. And thus, Peter is denominated honoured by reason of honour, which is not so much in the person honoured, as in him who honours.

**DENOMINATIVE QUALITY**, that quality from which things take their denomination. See the preceding article.

**DENOMINATOR**, in arithmetic, a term used in speaking of fractions.

The denominator of a fraction is the number below the line, shewing into how many parts the integer is supposed to be divided. Thus in the fraction  $\frac{3}{4}$ , the number 4 shews that the integer is divided into four parts. So in the fraction

$\frac{a}{b}$ ,  $b$  is the denominator. See the article **FRACTION**.

**DENOMINATOR of a ratio**, is the quotient arising from the division of the antecedent by the consequent. Thus 8 is the denominator of the ratio 40 : 5, because 40 divided by 5, gives 8 for a quotient. It is also called the exponent of a ratio. See the article **EXPONENT**.

**DE NON RESIDENTIA CLERICI REGIS**, a writ that lies where a person is employed in the king's service, in order to excuse him of non-residence upon his living.

**DENS, TOOTH**, in anatomy. See the article **TOOTH**.

**DENS CANIS, DOG'S TOOTH**, in botany, a distinct genus of plants, called by Linnaeus erythronium. See the article **ERYTHRONIUM**.

**DENS LEONIS, DANDELION**, a plant otherwise called leontodon. See the article **LEONTODON**.

**DENSHRING, or DEVENSHRING**, in husbandry. See **DEVENSHRING**.

**DENSALE, or DENSALIS**, a fish more usually called dentex. See **DENTEX**.

**DENSITY of bodies**, is that property directly opposite to rarity, whereby they contain such a quantity of matter under such a bulk.

Accordingly, a body is said to have double or triple the density of another body, when their bulk being equal, the quantity of matter is in the one double or

triple the quantity of matter in the other. The densities and bulks of bodies, are the two great points upon which all mechanics or laws of motion turn. It is an axiom that bodies of the same density contain equal masses under equal bulks. If the bulks of two bodies be equal, their densities are as their masses; consequently, the densities of equal bodies are as their gravities. If two bodies have the same density, their masses are as their bulks; and as their gravity is as their masses, the gravity of bodies of the same density is in the ratio of their bulk. Hence also bodies of the same density are of the same specific gravity; and bodies of different density, of different specific gravity. The quantities of matter in two bodies, are in a ratio compounded of their density and bulk: consequently their gravity is in the same ratio. If the masses or gravities of two bodies be equal, the densities are reciprocally as their bulks. The densities of any two bodies are in a ratio compounded of the direct ratio of their masses, and a reciprocal one of their bulks: consequently since the gravity of bodies is as their masses, the densities of bodies are in a ratio compounded of the direct ratio of their gravities, and a reciprocal one of their bulks. See the method of finding the specific gravities, and consequently the densities, of both solid and fluid bodies, and likewise a table of the specific gravities of bodies, under the articles **HYDROSTATICAL BALLANCE**, and **SPECIFIC GRAVITY**.

**DENSITY of the air**, is a property that has employed the later philosophers since the discovery of the toricellian experiment. It is demonstrated, that in the same vessel, or even in vessels communicating with each other at the same distance from the center, the air has every where the same density. The density of the air, *ceteris paribus*, increases in proportion to the compressing powers. Hence the inferior air is denser than the superior; the density, however, of the lower air, is not proportional to the weight of the atmosphere on account of heat and cold, and other causes perhaps which make great alterations in density and rarity. However, from the elasticity of the air, its density must be always different at different heights from the earth's surface; for the lower parts being pressed by the weight of those above, will be made

made to accede nearer to each other, and the more so as the weight of the incumbent air is greater. Hence, the density of the air is greatest at the earth's surface, and decreases upwards in geometrical proportion to the altitudes taken in arithmetical progression.

If the air be rendered denser, the weight of bodies in it is diminished; if rarer, increased, because bodies lose a greater part of their weight in denser than in rarer mediums. Hence, if the density of the air be sensibly altered, bodies equally heavy in a rarer air, if their specific gravities be considerably different, will lose their equilibrium in the denser, and the specifically heavier body will preponderate. See AIR and CONDENSER.

**DENSITY** of the planets. In homogeneous, unequal spherical bodies, the gravities on their surfaces are as the diameters, if the densities are equal. But if the bodies be equal, the gravities will be as the densities. Therefore, in bodies of unequal bulks and densities, the gravity will be in a compound ratio of the diameters and densities. Consequently, the densities will be as the gravities divided by the diameters, and therefore in the several bodies as follows, *viz.*

In the Sun. Jupiter. Saturn. Earth. Moon:  
10000. 9385. 6567. 39539. 48911.

As it is not likely that these bodies are homogeneous, the densities here determined are not to be supposed the true, but rather the mean densities, or such as the bodies would have if they were homogeneous, and of the same mass of matter, and magnitude.

**DENTALIUM**, in natural history, a simple shell having no hinge, and formed only of one piece: it is of a figure approaching to cylindric or conic, and is sometimes crooked, sometimes straight; sometimes closed at one end, sometimes open at both: its animal inhabitant is called nereis. See the article NEREIS.

The name dentalium has been given this shell, from the great resemblance it has to the dentes canini of quadrupeds. There are several species of it, frequent on the shores of Italy, Portugal, &c. Among us, they are found fossil in clay-pits, some smooth, some striated; but in much greater abundance in the mountains of France and Italy. See plate LXIX. fig. 4.

The true officinal dentalium is one of the canales, or tubuli marini simplices, of au-

thors: and the animal that inhabits it is of the genus of the nereis of Linnæus. See the article NEREIS.

Great things have been recorded of the virtues of the dentalium, but it has in reality no other than those of an alkali or absorbent, so that the readiness of oyster-shells has now put it out of use.

**DENTARIA, TOOTHWORT**, in botany, a genus of the *tetradynamia-filiquosa* class of plants, the corolla of which is cruciform, and consists of four roundish, obtuse petals, slightly emarginated, plane, and ending in unguis of the length of the cup: the fruit is a long, roundish, bilocular pod, consisting of two valves: the seeds are numerous and roundish. See plate LXIX. fig. 6.

The root of this plant, the only part used in medicine, is accounted drying and astringent.

**DENTARIÆ AFFINIS**, a name given by some to the orobanche of Linnæus. See the article OROBANCHE.

**DENTARIÆ FACIE**, in botany, the same with the hydrophyllum. See the article HYDROPHYLLUM.

**DENTATED LEAF**, among botanists, one notched at the edges with a number of blunt points in some measure resembling teeth. See the article LEAF.

**DENTED, or INDENTED**. See the article INDENTED.

**DENTES, TEETH**. See DENS.

**DENTEX**, in ichthyology, a species of sparus, of a deep olive-brown colour, elegantly variegated with darker and paler spots: its back is acute or ridged, and it has four large teeth: it is a well tasted fish. See the article SPARUS.

**DENTILES, or DENTILS**, in architecture, an ornament in corniches bearing some resemblance to teeth, particularly used in the ionic and corinthian orders. They are cut on a little square member, properly called denticulus, and the notches or ornaments themselves, dentils. In ancient times dentiles were never used in the ionic cornice, yet they are found in the remains of the theatre of Marcellus, which some take for an argument that Vitruvius had not the direction of that building. Vitruvius prescribes the breadth of each dentil to be half its height, and the indenture or interval between each two, he directs to be two thirds of the breadth of the dentil.

**DENTICULI ELEPHANTIS**, the same with the dentalia. See DENTALIUM.

**DENTIFORM**

**DENTIFORM PROCESS**, in anatomy.

See the article **PYRENOIDES**.

**DENTIFRICE**, in medicine, a remedy for rubbing the teeth, and purging them from fordes; and for cleansing and absterging the gums, when replete with humours. There are dentifrices of various kinds and forms, some in form of a powder composed of corals, pumice-stone, salt, allum, egg-shells, crabs-claws, hartshorn, &c. others in form of an electuary, consisting of the same powders mixt up with honey; others are in form of a liquor drawn by distillations from drying herbs, and astringent medicines, &c. See **TEETH**.

The generality of operators for the teeth allow acids, such as spirit of vitriol, &c. to be the readiest of all dentifrices, to take off the foulness and yellowness of the teeth: but yet, they don't advise a frequent use of these remedies, as they wear away too much of the teeth and injure the gums.

The Dutch account butter the best dentifrice for keeping the teeth white and sound, and the Spaniards hold urine to be good for that purpose.

**DENTIL**, in architecture, the same with denticle. See the article **DENTICLE**.

**DENTILLARIA**, **LEADWORT**, a plant more usually called plumbago. See the article **PLUMBAGO**.

**DENTISCALPRA**, in surgery, an instrument for scouring yellow, livid, or black teeth; to which being applied, near the gums, it scrapes off the foul, morbid crust.

Some of these instruments are furnished with narrow points; others with broader, and with edges; and some again are falciform; but all of them adapted to one and the same handle.

**DENTITION**, the breeding, or cutting, the teeth in children.

Among all the disorders which afflict children, there are none generate such grievous symptoms as difficult dentition. About five or six months after birth, the teeth generally begin to make their appearance: first, the incisors, or fore-teeth; next, the canini, or dog teeth; and, lastly, the molares, or grinders. About the seventh year there comes a new set; and at twenty-one the two inner grinders, called *dentes sapientiæ*, or teeth of wisdom. At the time of cutting their teeth, they slobber very much, and have a diarrhæa, which is no bad sign: but when it is difficult, especially when

the canine teeth begin to be in motion, and make their way out through the gums, the child has startings in his sleep, tumours of the gums, gripes, a loquacity or costiveness, greenish stools, the thrush, fevers, difficult breathing, suffocating catarrhs, convulsions, epilepsies, which often end in death.

It shews the dentition is like to be bad, if the child is perpetually crying, thrusts his finger into his mouth, and bites the nurse's nipples; if unequal tubercles are perceived in the gums, where the teeth are expected to appear; if there is a heat in the mouth, and the whole body; if they start without a cause, especially in sleep.

Harris observes, that when an inflammation appears, the physicians will labour in vain, if the cure is not begun by applying a leech under each ear. When the swelling of the gum shews it is time to cut it, to make way for the tooth, he would have it done with a pen-knife, not with a fine lancet, lest the wound should heal, and form a cicatrix. The food he directs to be no more than lukewarm.

Heister internally advises aqueous mixtures, temperating powders; externally, oil of sweet almonds, with spirit of violets, or spirit of wild poppies, lightly acidulated with spirit of vitriol, where-with often to rub the gums; as also with the coral, or other smooth thing, which will have the same effect. Some reckon the fresh blood of a cock's comb a specific for this purpose. Morgan affirms, in this case, it will be best to abate the effluence of the blood with diuters; to appease the pain with gentle opiates; to open the body with purges and clysters; to draw off the fermented serum by blisters; to promote the cutting of the teeth by cooling, relaxing, and opening the gums: for this purpose diacodium is good, or a strong decoction of marshmallows and poppy-heads, in thick milk, cream, or neats-foot oil.

Sydenham observes, that pains in dentition often produce fevers: for which he could find no remedy so effectual as three or four drops of spirit of hartshorn in a spoonful of simple water, or other convenient vehicle, given every four hours: the number of doses may be four, five, or six.

**DENUNCIATION**, a solemn publication or promulgation of any thing.

All vessels of enemies are lawful prize,

after denunciation or proclamation of war. The design of the denunciation of excommunicated persons, is that the sentence may be the more fully executed by the person's being more known.

**DEOBSTRUENTS**, in pharmacy, such medicines as open obstructions. See the article **DETERGENT**.

There is somewhat further expressed in the term *deobstruent* than in *detergent*, for a medicine may be *deobstruent* that is not, in the strictest sense, *detergent*; as are most metalline substances, as steel and mercury, which obtain the appellation *deobstruents*, from their acting by their natural weight, whereby they increase the momentum of the circulating fluids, and with greater force make it strike against the secretory outlets: because the momenta, or vis percussiois, of all projectiles, of which kind is a circulating fluid, is as their solidities, supposing their velocities equal. The more, therefore, the animal fluids are saturated with dense and solid particles, with the greater force they distend the vessels, and the more easily break through, where the structure favours their escape; and upon that account are medicines, which add to these qualities in the fluid, called *deobstruents*.

**DEODAND**, in our customs, implies a thing devoted or consecrated to God, for the pacification of his wrath, in case of any misfortune; as a person's coming to a violent end, without the fault of any reasonable creature; as if a horse should strike his keeper, and so kill him. In this case, the horse is to be a *deodand*; that is, he is to be sold, and the price distributed to the poor, as an expiation of that dreadful event.

**DE ONERANDO PRO RATA PORTIONIS**, in law, a writ that lies where a person is distrained for rent, which ought to be paid by others in proportion with him; as where one holds twenty acres of land by fealty, at a certain rent, and aliens one acre to one person, and another to another: here, if one of the alienees be distrained for the whole, or more rent than the value of what he purchased, he then may have this writ.

**DEOPPILATIVES**, in pharmacy, the same with *deobstruents*. See the article **DEOBSTRUENTS**.

**DEPART**, in chemistry, a method of refining, or separating gold from silver, by means of *aqua fortis*, generally called *quartation*.

For the operation of the *depart*, see the article **ASSAYING** and **QUARTATION**.

**DEPARTURE**, in law, signifies a departing or going from a plea given in bar of an action. It is likewise used where a plaintiff in his declaration sets forth one thing, and after the defendant has pleaded thereto, he in his replication shews new matter different from his declaration.

If a person pleads a general agreement in bar, and alleges a special one in his rejoinder, this will be a *departure* in pleading: so, where an action is brought at common law, and the plaintiff, by his replication, endeavours to maintain it by custom. It will also be accounted a *departure*, if, after performance is pleaded in debt upon hand, the defendant says any other thing, by way of excuse, &c. But in circumstances of time, &c. laid as to promises, if the defendant by his plea force the plaintiff to vary, it is no *departure*: for the plaintiff is not tied to a precise day.

**DEPARTURE in despite of the court**, is where a tenant or defendant appears to an action brought against him, and having a day over in the same term, does not appear at the day, but makes a default. This is a *departure in despite of the court*, and therefore he shall be condemned.

**DEPARTURE**, in navigation, is the easting or westing of a ship in respect of the meridian it departed or sailed from: or it is the difference of longitude, either east or west, between the present meridian the ship is under, and that where the last reckoning or observation was made. This *departure*, any where but under the equator, must be accounted according to the number of miles in a degree, proper to the parallel the ship is under.

**DEPHLEGMATED**, an appellation given to spirits well freed from phlegm. See the next article.

**DEPHLEGMATION**, in chemistry, the same as rectification, or the freeing a spirit from its phlegm, either by distillation, or some other means.

**DEPILATORY MEDICINES**, those applied in order to take off the hair: such are lime and orpiment known to be, but which ought to be used with great caution. See **LIME** and **ORPIMENT**.

**DEPONENT**, in latin grammar, a term applied to verbs, which have active significations, but passive terminations or conjugations, and want one of their participles passive.

**DEPONENT**,

**DEPONENT**, in the law of Scotland, a person who makes a deposition. See the article **DEPOSITION**.

**DEPOPULATION**, the act of committing waste. See the article **WASTE**.

**DEPORTATION**, a sort of banishment used by the Romans, whereby some island or other place was allotted to a criminal for the place of his abode, with a prohibition not to stir out of the same on pain of death.

**DEPOSIT**, among civilians, something that is committed to the custody of a person, to be kept without any reward, and to be returned again on demand.

Deposit is distinguished into simple and judiciary.

*Simple* **DEPOSIT** is either voluntary or necessary: necessary, is that done in case of hostility, shipwreck, fire, &c.

*Judiciary* **DEPOSIT** is that whose property is contested by several persons, and deposited in the custody of some third person, by order of a judge.

**DEPOSITARY**, in the french law, a person intrusted as keeper or guardian of a deposit. See the preceding article.

Ordinary depositaries are not to warrant the thing left with them, in case it be lost or stolen: they are only to answer for fraud or the like.

**DEPOSITION**, in law, the testimony given in court by a witness, upon oath.

In chancery, deposition is a testimony set down in writing, by way of answer to the interrogations exhibited in chancery, where such witness is called deponent. Depositions in one cause may be used at the hearing of another, where they are between the same parties, &c. without any motion: this is not permitted in other courts, without a special order of the court of chancery. The depositions in chancery, after the cause is determined there, may be given in evidence in a trial at bar, in any of the other courts.

**DEPOSITION** also signifies the sequestring or depriving a man of some dignity and office.

**DEPRECATION**, in rhetoric, a figure whereby the orator invokes the aid and assistance of some one; or prays for some great evil or punishment to befall him who speaks falsely, either himself or his adversary.

**DEPRECATORY**, or **DEPRECATIVE**, in theology, a term applied to the manner of performing some ceremonies in the form of prayer.

The form of absolution is deprecativ in

the greek church, being conceived in these terms, *May God absolve you*: whereas it is in the declarative form in the latin church, and in some of the reformed churches, *I absolve you*.

**DEPRESSION** of equations. See the article **EQUATION**.

**DEPRESSION** of the pole. When a person sails or travels towards the equator, he is said to depress the pole, because as many degrees as he approaches nearer the equator, so many degrees will the pole be nearer the horizon. This phenomenon arises from the spherical figure of the earth. See **EARTH** and **POLE**.

When a star is under the horizon, it is termed the depression of that star under the horizon. The altitude or depression of any star is an arch of the vertical intercepted between the horizon and that star. See **HORIZON** and **VERTICAL**.

**DEPRESSOR**, or **DEPRIMENS**, in anatomy, a name applied to several muscles, because they depress the parts they are fastened to.

**DEPRESSOR LABII INFERIORIS**, or **QUADRATUS**, is a muscle consisting of some thin fleshy fibres, which lie immediately under the skin of the chin; they arise from the edge of the fore-part of the whole under-jaw, and are inserted in the lower-part of the orbicularis.

**DEPRESSOR LABII SUPERIORIS**, or **TRIANGULARIS**, is a muscle that arises from the lower edge of the under-jaw, between the masseter and quadratus, and ascends by the angle of the mouth to the upper-jaw. These two muscles acting together, express a sorrowful countenance, because they draw downwards the corners of the mouth and cheeks.

**DEPRESSORES NASI**, a pair of muscles arising from the os maxillare, above the dentes incisores; and are inserted into the extremities of the alæ, which they pull downwards.

**DEPRESSOR ANGULI ORIS**, a name given by Albinus to the muscle called by others depressor labiorum communis. See the article **DEPRESSOR LABII**.

**DEPRESSORES OCULI**, a pair of muscles springing from each corner of the eye, and answered by another pair of the like figure and structure, in the lower eyelid. See **EYE**.

**DEPRIMENS**, the same with depressor. See the preceding article.

**DEPRIVATION**, in the canon-law, the deposing a bishop, parson, vicar, &c from his office and preferment.

There are two sorts of deprivation, the one *a beneficio*, the other *ab officio*: the deprivation *a beneficio*, is when, for some great crime, a minister is wholly deprived of his benefice. A deprivation *ab officio*, is when a minister is for ever deprived of his orders, which is also called deposition or degradation: this is generally for some heinous crime deserving death, and is performed by the bishop.

**DEPTFORD**, a town three miles east of London, on the southern banks of the Thames; chiefly considerable for its fine docks for building ships, and the king's yard.

**DEPTH**, in geometry, the same with altitude; though, strictly speaking, we only use the term depth to denote how much one body, or part of a body, is below another. See the articles **ALTITUDE**, **HEIGHT**, &c.

**DEPTH of a battalion, squadron, &c.** the number of men in a file, or who stand before each other, in a straight line. In the ancient armies this was very great.

**DEPURATION**, the same with clarification. See the article **CLARIFICATION**.

**DEPURATORY FEVER**, a name given by Sydenham to a fever which prevailed much in the years 1661, 1662, 1663, and 1664. He called it depuratory, because he observed that nature regulated all the symptoms in such a manner, as to fit the febrile matter, prepared by proper concoction, for expulsion in a certain time, either by a copious sweat, or a freer perspiration.

**DEPUTATION**, a mission of select persons out of a company, or body, to a prince or assembly, to treat of matters in their name. They are more or less solemn, according to the quality of those who send them, and the business they are sent upon.

**DEPUTY**, a person sent upon some business, by some community.

**DEPUTY** is also one that exercises an office in another's right; and the forfeiture or misdemeanor of such deputy shall cause the person, whom he represents, to lose his office. A principal officer may not appoint his deputy in all cases, unless the grant of the office will justify him in so doing; but when an office descends to an infant, he may make a deputy of course. Judges have no power to hold their courts by deputy: recorders, however, may do it. It is held a coroner cannot appoint a deputy, it being a judicial office of trust, annexed to the per-

son. And if the office of parkership be granted to one, he cannot depute another, because it is an office of trust and confidence.

**DEPUTATUS**, among the antients, a name applied to persons employed in making of armour: and likewise to brisk active people, whose business was to take care of the wounded in engagements, and carry them off the field.

**DEPUTATUS**, *demularis*, in the greek church, an inferior officer, like an usher, who in processions kept the crowd off the patriarch.

**DE QUIBUS SUR DISSEISIN**, in law, a writ of entry. See **ENTRY**.

**DERBENT**, a city of Dagistan, on the western coast of the Caspian sea: east lon.  $51^{\circ}$ , and  $41^{\circ} 15'$  north lat.

**DERBIA**, a name given by some surgeons to the impetigo. See **IMPETIGO**.

**DEREHAM**, a market-town of Norfolk, about fifteen miles west of Norwich: east long.  $1^{\circ}$ , and north lat.  $52^{\circ} 40'$ .

**DEREIGN**, or **DARAIGN**. See the article **DARAIGN**.

**DERELICTS**, in the civil law, such goods as are wilfully relinquished by the owner.

**DERELICT** signifies also a thing forsaken, or cast away by the sea.

**DERIVATION**, in medicine, is when a humour, which cannot be conveniently evacuated at the part affected, is attracted from thence, and discharged at some more proper place in its vicinity; or is drawn from a noble to a more ignoble part, where it is less capable of doing injury. Thus a blister is applied upon the neck to draw thither the matter, in cases of defluxions upon the eyes.

**DERIVATIVE**, in grammar, a word which is derived from another called its primitive. See **PRIMITIVE**.

Thus *manhood* is derived from *man*, *deity* from *deus*, and *lawyer* from *law*.

**DERMA**, in anatomy, the same with cutis. See the article **CUTIS**.

**DERMESTES**, in zoology, a genus of insects of the order of the coleoptera, the antennæ of which are of a clavated figure and perfoliated transversely.

There are a great many species of this genus, confounded by some with beetles. See plate **LXIX.** fig. 2.

**DERNIER RESSORT**. See **RESSORT**.

**DEROGATION**, in the french law, an act which annuls a preceding one, either in whole, or in part. In general terms, they are not regarded in judicature; they must be in specific, and in formal terms.

**DEROGATORY**,



**DEROGATORY**, a clause importing derogation. A derogatory clause in a testament, is a certain sentence, cypher, or secret character, which the testator inserts in his will, and of which he reserves the knowledge to himself alone, adding a condition that no will he may make hereafter is to be reckoned valid, if this derogatory clause is not inserted expressly, and word for word. It is a precaution invented by lawyers against last wills extorted by violence, or obtained by suggestion.

**DERPT**, a town of Livonia, situated on the river Eimbec : east lon.  $28^{\circ} 10'$ , and north lat.  $58^{\circ} 10'$ .

**DERVIS**, a name given to all mahommedan monks, though of various orders. The most noted among them are the bektasli, the mevelevi, the kadri, and the seyah. The bektasli, who are allowed to marry and live in cities and towns, are obliged, by the rules of their order, to visit remote lands, and to salute every one they meet with *gazel*, or love-songs, and with *esma*, or the invocation of the names of God, and humbly to wish him prosperity, which they do by repeating the word *eivallab*, a solemn exclamation of the wrestlers, by which the conquered yields the palm to the conqueror. The mevelevi, so called from Mevelava their founder, are used to turn round for two or three hours together, with such swiftness that you cannot see their faces; they are great lovers of music: in their monasteries they profess great humility and poverty, and when visited make no distinction of persons; they first bring their guests coffee to drink; and, if the ways have been dirty, they wash their feet and sandals. The kadri, with a peculiar superstition, emaciate their bodies; they go quite naked, except their thighs, and often join hands and dance, sometimes a whole day, repeating with great vehemence, *hu! hu! hu!* (one of the names of God) till, like madmen, they fall on the ground, foaming at the mouth, and running down with sweat: the prime vizir Kupruli Achmed Pasha, thinking this sect unbecoming the mahommedan religion, ordered it to be suppressed; but, after his death, it revived, and is at present more numerous than ever, especially at Constantinople. The seyah are wanderers, and though they have monasteries, yet they often spend their whole life in travelling; when they are sent out, their superiors impose upon them such a quantity of mo-

ney or provisions, forbidding them to come back till they have procured it, and sent it to the monastery; wherefore when a seyah comes into a town, he cries aloud in the market-place, *Ya allah senden, &c. O God! give me, I pray, five thousand crowns, or a thousand measures of rice*. Many of these dervises travel over the whole mahommedan world, entertaining the people wherever they come, with agreeable relations of all the curiosities they have met with. There are dervises in Egypt, who live with their families, and exercise their trades, of which kind are the dancing dervises at Damascus. They are all distinguished among themselves by the different forms and colours of their habits; those of Persia wear blue; the folitaries and wanderers wear only rags of different colours; others carry on their heads a plume made of the feathers of a cock; and those of Egypt wear an octagonal badge of a greenish white alabaster at their girdles, and a high stiff cap, without any thing round it.

**DERWENT**, a river, which taking its rise in the north riding of Yorkshire, runs south, and falls into the Ouse.

**DERWENT-WATER**, a river of Cumberland, which falls into the irish sea below Cockermouth.

**DESART**, a large extent of country entirely barren, and producing nothing. In this sense some are sandy desarts, as those of Lop, Xamo, Arabia, and several others, in Asia; in Africa, those of Lybia and Zara: others are stony, as the desert of Pharan in Arabia Petrea.

*The* **DESART**, absolutely so called, is that part of Arabia south of the holy land, where the children of Israel wandered forty years.

**DESCANT**, in music, the art of composing in several parts. See **COMPOSITION**.

Descant is threefold, *viz.* plain, figurative, and double.

*Plain* **DESCANT** is the ground-work and foundation of all musical compositions, consisting altogether in the orderly placing of many conecords, answering to simple counterpoint. See **COUNTERPOINT**.

*Figurative or florid* **DESCANT**, is that part of an air of music, wherein some discords are concerned, as well, though not so much, as conecords. This may be termed the ornamental and rhetorical part of music, in regard that there are introduced all the varieties of points, syncopes, diversities of measures, and whatever is capable of adorning the composition.

**DESCANT**

**DESCANT** *double*, is when the parts are so contrived, that the treble, or any high part, may be made the bass; and, on the contrary, the bass the treble. See the articles **HARMONY**, **COUNTERPOINT**, and **MELODY**.

**DESCENDANT**, in genealogy, a term relative to ascendant, and applied to a person who is born or issued from some other referred to: thus mankind are said to be the descendants of Adam. See the article **DESCENT**.

**DESCENSION**, or **DESCENDING**, in general, signifies much the same with descent. See the article **DESCENT**.

**DESCENSION**, in astronomy, is either right or oblique.

**Right DESCENSION** is an arch of the equinoctial, intercepted between the next equinoctial point and the intersection of the meridian, passing through the center of the object, at its setting, in a right sphere.

**Oblique DESCENSION**, an arch of the equinoctial intercepted between the next equinoctial point and the horizon, passing through the center of the object, at its setting, in an oblique sphere.

**DESCENSIONAL**, something belonging to descension. See **DESCENSION**.

**DESCENSIONAL DIFFERENCE**, that between the right and oblique descension of any heavenly body. See **DESCENSION**.

**DESCENT**, in general, is the tendency of a body from a higher to a lower place; thus all bodies, unless otherwise determined by a force superior to their gravity, descend towards the center of the earth: the planets too may be said to descend from their aphelion to the perihelion of their orbits, as the moon does from the apogee to the perigee.

Heavy bodies, meeting with no resistance descend with an uniformly accelerated motion, for the laws of which see the article **ACCELERATION**.

*Laws of the DESCENT of bodies.* 1. All bodies near the surface of the earth descend perpendicularly at the rate of sixteen feet one inch in a second of time. 2. The velocity of a body descending in an inclined plane, at the end of any given time, is to the velocity that it would acquire by descending perpendicularly in the same time, as the altitude of the inclined plane is to its length. 3. The last velocity acquired by the direct descent, is to the last velocity acquired in the same time by the oblique descent, as the absolute gravity is to the relative gravity of

the descending body. 4. The line described by the direct descent, is to the line described in the same time by the oblique descent, as the length of the oblique plane is to its height. 5. If the line described by the direct descent be to the line described by the oblique descent, as the height of the inclined plane to its length, then the times of descent shall also be in the same proportion, and the last velocities equal. 6. The last velocities acquired upon several inclined planes of the same height, however different in length, are equal. 7. The time of oblique descent thro' any chord of a circle, drawn from its lowest point, is equal to the time of a direct descent through the diameter of that circle. 8. The last acquired velocities of a body, descending to the lowest point of a given circle, through different chords, are as those chords. 9. The time of the descent of a body in any arch of a semicycloid, is equal to the time of its descent through any other arch, whether longer or shorter, of the same curve. 10. A body will descend sooner along an arch of a cycloid, than along that of any other curve, drawn between the same points. 11. If water runs out through a hole made in the bottom of a parabolic conoid, the surface of the water will descend equal spaces in equal times. 12. A body descends in a resisting medium with a force only equal to the excess of its gravity above that of an equal bulk of the medium. 13. If a body be thrown downwards, in a resisting medium, with such a force as shall make the resistance of the medium equal to the acceleration of gravity, it will afterwards descend with an uniform motion. 14. If a body descends through any number of inclined planes, it will acquire the same velocity at the end of its fall, as though it had fallen through a plane equal in height to the whole, and of the same inclination with the last of them.

**DESCENT**, or **DISCENT**, in law, an order or method whereby lands or tenements are derived to any man from his ancestors.

It is either by the common law, custom, or statute. By the common law, as, where a person has lands of inheritance in fee, and dies without having made any disposal thereof: wherefore the land descends and goes in course to the eldest son and heir. By custom, as where the lands sometimes descend to all the sons; or to all the brothers, where one brother dies without issue, as in gavel-kind, &c. And descent

descent by statute is a descent in fee-tail, as directed by the manner of the limitation or settlement, pursuant to stat. Westm. 2 and 13 Ed. I.

Descent, at common law, is either lineal or collateral.

Lineal descent is that conveyed down in a right line from the grand-father to the father, from the father to the son, and from the son to the grand-son. Collateral descent is that springing out of the side of the line, or blood, as from a man to his brother, nephew, or the like.

**DESCENT**, in genealogy, the order or succession of descendants in a line or family; or their distance from a common progenitor: thus we say, one descent, two descents, &c. See **EXTRACTION**.

**DESCENT**, in heraldry, is used to express the coming down of any thing from above; as, a lion en descent, is a lion with his head towards the base points, and his heels towards one of the corners of the chief, as if he were leaping down from some high place.

**DESCENTS**, in fortification, are the holes, vaults, and hollow places made by undermining the ground.

The descent into the moat or ditch is a deep passage made through the esplanade and covert-way, in form of a trench, whereof the upper part is covered with madriers and clays, to secure the besiegers from the enemy's fire. In wet ditches this trench is on a level with the surface of the water, but in dry ones it is sunk as deep as the bottom of the ditch.

**DESCRIBENT**, in geometry, a line or surface, which, by moving parallel to itself, describes a surface or solid. See the articles **LINE**, **SURFACE**, and **SOLID**.

**DESCRIPTION**, is such a strong and beautiful representation of a thing, as gives the reader a distinct view and satisfactory notion of it.

Descriptions are almost peculiar to poetry: historians indeed describe things, places, and persons; but not so much for the sake of ornament, as of necessity. Orators likewise attempt descriptions when they have a mind to work upon the passions; but neither the one nor the other use them as decorations to their writings, which poets generally do, very successfully, not only with a design to move the passions, but to please the fancy. Great judgment is required in the due exercise of this art. A judicious author will omit low and vulgar circumstances, and chiefly bestow his pains to

complete all the essential and masterly strokes, cutting off all superfluities, and rejecting the most pleasing thought and florid lines, when foreign to his subject: many things must be left to the imagination of the reader, and seasonable silence has its emphasis; thus Virgil tells us, Georg. iv. 457. that Eurydice was killed by a monstrous serpent, lurking in a bank; but says nothing more of that venomous creature. A poetaster would probably have spent as many lines in the description of it, as composed that admirable poem. The description of a person is called a character, in drawing which the true proof of art and judgment is to hit a beautiful likeness, and, with a delicate touch, to give those features and colours which are peculiar to the person, and distinguishing him from the rest of mankind. In every good and lively description, a man must come to an enumeration of the chief particulars; for generals are often obscure and faint. A judicious author, by setting every thing in full view, makes a strong and lasting impression on the reader.

**DESEADA**, or **DESIDERADA**, one of the Caribbee-islands, subject to France, lying eastward of Guardaloupe. See the article **CARIBBEE**.

**DEserter**, in a military sense, a soldier who, by running away from his regiment or company, abandons the service.

A deserter is, by the articles of war, punishable by death, and, after conviction, is hanged at the head of the regiment he formerly belonged to, with his crime writ on his breast, and suffered to hang till the army leave that camp, for a terror to others.

**DESHACHE'**, in heraldry, is where a beast has its limbs separated from its body, so that they still remain on the escutcheon, with only a small separation from their natural places.

**DESIDERATUM** is used to signify the desirable perfections in any art or science: thus, it is a desideratum with the blacksmith, to render iron fusible by a gentle heat, and yet preserve it hard enough for ordinary uses; with the glassman and looking-glass maker, to render glass malleable; with the clock-maker, to bring pendulums to be useful, where there are irregular motions; with the brasier and copper-smith, to make malleable solder; with the shipwright, to build vessels that will sail under water; with the diver, to procure manageable instruments

for conveying fresh air to the bottom of the sea, sufficient for respiration and the burning of lights; with the assayer-master, to melt or copel ores or metals immediately, without the use of bellows or furnaces; and with the carvers and joiners, to fashion wood in moulds like plaister of paris, or burnt alabaſter, &c. And tho', as Mr. Boyle observes, the obtaining of these desiderata may be thought chimerical, yet it is proper they should be proposed; for, although perfection may not be attainable, yet approaches to it may be made, and arts thereby improved. To this may be added, that the making of iron malleable with pit-coal was once looked upon as chimerical, yet it is now put in practice, to the great advantage of the owners of several mines in this kingdom.

All arts have their defects; and it is not at first to be guessed, for how many of these remedies may be found, by means of chemical researches, properly directed. Chemistry itself is greatly defective in many particulars, as in an experimental history of general fermentation, separatory and combinatory; in subjects of the animal, vegetable, and mineral kingdoms. The schemes for new trades will rise occasionally in prosecuting many of the subjects; thus it is natural for the common operations of brewing and sugar-baking, to suggest that sugar may be procured from malt and other vegetables. That nurseries of peculiar ferments, both native and foreign, may be raised on the common principles; and it is evident that the introduction of such new trades would greatly improve the business of brewing, sugar-baking, and the like.

**DESIGN**, in a general sense, the plan, order, representation, or construction of a building, book, painting, &c.

In building, the term *ichnography* may be used, when by design is only meant the plan of a building, or a flat figure drawn on paper: when some side or face of the building is raised from the ground, we may use the term *orthography*; and when both front and sides are seen, in perspective, we may call it *scenography*. See **ICHOGRAPHY**, **ORTHOGRAPHY**, and **SCENOGRAPHY**.

**DESIGN**, in the manufactories, expresses the figures wherewith the workman enriches his stuff, or silk, and which he copies after some painter, or eminent draughts-man, as in diaper, damask, and other flowered silk and tapestry, and the like.

In undertaking of such kinds of figured stuffs, it is necessary, says Mons. Savary, that, before the first stroke of the shuttle, the whole design be represented on the threads of the warp; we do not mean in colours, but with an infinite number of little packthreads, which, being disposed so as to raise the threads of the warp, let the workmen see, from time to time, what kind of silk is to be put in the eye of the shuttle, for woof. This method of preparing the work is called reading the design, and reading the figure, which is performed in the following manner: a paper is provided, considerably broader than the stuff, and of a length proportionate to what is intended to be represented thereon. This they divide lengthwise, by as many black lines as there are intended threads in the warp; and cross these lines, by others drawn breadthwise, which, with the former, make little equal squares: on the paper thus squared, the draughts-man designs his figures, and heightens them with colours, as he sees fit. When the design is finished, a workman reads it, while another lays it on the simblot. See the article **SIMBLOT**.

To read the design, is to tell the person who manages the loom, the number of squares, or threads, comprised in the space he is reading, intimating at the same time whether it is ground or figure. To put what is read on the simblot, is to fasten little strings to the several packthreads, which are to raise the threads named; and thus they continue to do till the whole design is read.

Every piece being composed of several repetitions of the same design, when the whole design is drawn, the drawer, to re-begin the design afresh, has nothing to do but to raise the little strings, with slip-knots, to the top of the simblot, which he had let down to the bottom: this he is to repeat as often as is necessary till the whole be manufactured.

The ribbon-weavers have likewise a design, but far more simple than that now described. It is drawn on paper with lines and squares, representing the threads of the warp and woof. But instead of lines, whereof the figures of the former consist, these are constituted of points only, or dots, placed in certain of the little squares, formed by the intersection of the lines. These points mark the threads of the warp that are to be raised, and the spaces left blank denote the threads that

are

are to keep their situation : the rest is managed as in the former.

**DESIGN** is also used, in painting, for the first idea of a large work, drawn roughly, and in little, with an intention to be executed and finished in large. The art of painting has been by some of the greatest masters divided into the design, or draught, the proportion, the expression, the *claro-obscuro*, the *ordonnance*, the colouring, and the perspective.

Design, in painting, is the simple contour, or outlines of the figures intended to be represented, or the lines that terminate and circumscribe them : such design is sometimes drawn in crayons, or ink, without any shadows at all ; sometimes it is hatched, that is, the shadows are expressed by sensible outlines, usually drawn across each other with the pen, crayon, or graver. Sometimes, again, the shadows are done with the crayon rubbed so as that there do not appear any lines : at other times, the grains or strokes of the crayon appear, as not being rubbed : sometimes the design is washed, that is, the shadows are done with a pencil in indian ink, or some other liquor ; and sometimes the design is coloured, that is, colours are laid on much like those intended for the grand work.

The essential requisites of a design are correctness, good taste, elegance, character, diversity, expression, and perspective. Correctness depends on the justness of the proportions, and knowledge of anatomy. Taste is a certain manner of correctness peculiar to one's self, derived either from nature, masters, or studies, or all of them united. Elegance gives a delicacy that not only strikes persons of judgment, but communicates an agreeableness that pleases universally. The character is what is peculiar to each thing, wherein there must be diversity, inasmuch that every thing has its peculiar character to distinguish it. The expression is the representation of an object, according to the circumstances it is supposed to be in. Perspective is the representation of the parts of a painting, or a figure, according to the situation they are in with regard to the point of sight. See **CORRECTNESS**, &c. The design or draught, is a part of the greatest import and extent in painting. It is acquired chiefly by genius and application, rules being of less avail here than in any other branches of the art, as colouring, &c. The principal rules that regard design are, that novices accustom themselves to copy good originals at first

sight ; not to use squares in drawing, lest they stint and confine their judgment ; to design well from life, before they practise perspective ; to learn to adjust the size of their figures to the visual angle, and the distance of the eye from the model or object ; to mark out all the parts of their design before they begin to shade ; to make their contours in great pieces, without taking notice of the little muscles, and other breaks ; to make themselves masters of the rules of perspective ; to observe the perpendicular, parallel, and distance of every stroke ; to compare and oppose the parts that meet and traverse the perpendicular, so as to form a kind of square in the mind, which is the great and almost the only rule of designing justly ; to have a regard not only to the model, but to the parts already designed, there being no such thing as designing with strict justness, but by comparing and proportioning every part to the first. All the other rules relate to perspective. See **PERSPECTIVE**.

**DESIGNATION**, the act of marking or indicating, and making a thing known. There were designations of the consuls and other magistrates among the Romans some time before their election.

**DESIGNATOR**, in roman antiquity, a sort of petty master of the ceremonies, who assigned every body their places in the theatres, and other public shews. The Romans had officers of this nature attending all their solemn shews and processions, for directing precedencies. The designator was one of the goddess Libitina's principal servants, the shews of the funerals of persons of quality being marshalled by the designator. When he went to raise the corps, he was attended with a train of funeral officers called *libitinarii*, subdivided into *pellinatores*, *vespiliones*, *uitores*, &c. All these, habited in black, walked before the designator, as mace-bearers before magistrates.

**DESIGNING**, the art of delineating or drawing the appearance of natural objects, by lines, on a plane.

To design according to the rules of mathematics, makes the object of perspective. See the article **PERSPECTIVE**.

To design by the camera obscura. See the article **CAMERA OBSCURA**.

*Mechanical method of DESIGNING*. There are several methods of designing mechanically. The following is the method of the learned Sir Christopher Wren, and may be put in practice with great ease.

A is a small fight, with a short arm B (plate LXIX. fig. 5.) which may be turned round about, and moved up and down the small cylinder CD, which is screwed into the piece ED, at D; this piece ED moving round about the center E, by which means the fight may be removed either towards E or F.

EF is a ruler fastened on the two rulers GG, which rulers serve both to keep the square frame SSSS perpendicular, and, by their sliding through the square holes TT, they serve to stay the fight, either farther from, or nearer, to the said frame; on which frame is stuck on, with a little wax, the paper OOOO, whereon the picture is to be drawn by the pen I. The pen I is, by a small brass-handle V, so fixed to the ruler HH, that the point I may be kept very firm, so as always to touch the paper. HH is a ruler that is constantly, by means of the small strings aaa, bbb, moved horizontally, or parallel to itself; at the end of which is stuck a small pin, whose head P is the fight, which is to be moved up and down on the out-lines of any object.

The contrivance of the strings is this: the two strings aaa, bbb, are exactly of an equal length. Two ends of them are fastened into a small leaden weight, which is employed in a socket on the backside of the frame, and serves exactly to counterpoise the ruler HH, being of an equal weight with it. The other two ends of them are fastened to two small pins HH, after they have rolled about the small pulleys MM, LL, KK; by means of which pulleys, if the pen I be taken hold of, and moved up and down the paper, the string moving very easily, the ruler will always remain in an horizontal position.

The manner of using it is this: set the instrument upon a table, and fix the fight A at what height above the table, and at what distance from the frame SSSS, you please. Then looking through the fight A, holding the pen I in your hand, move the head of the pin P up and down the out-lines of the object, and the point of the pen I will describe on the paper OOOO the shape of the object so traced.

**DESION**, the macedonian name of the month, called by the Athenians antheſterion. See the article **ANTHESTERION**.

**DESISE**, a town of France, situated on the river Loire, fifteen miles south-east of Nevers: east long.  $3^{\circ} 32'$ , north lat.  $46^{\circ} 48'$ .

**DE SON TORT DEMESN**, in law, a formula used, in an action of trespass, by way of reply to the defendant's plea; signifying that the trespass was his own voluntary and free act.

**DESPOTE**, a term sometimes used for an absolute prince. See the next article.

Under the emperors of Constantinople, despote was a title of honour given to the emperor's sons, or sons in law; as also to their colleagues, and partners in the imperial dignity, in the same manner as Cæſar was at Rome. See **CÆSAR**.

**DESPOTICAL**, in general, denotes any thing that is uncontroled and absolute; but is particularly used for an arbitrary government, where the power of the prince is unlimited, and his will a law to his subjects: such are those of Turkey, Persia, and most of the eastern governments; and even those of Europe, if we except the republics, our own, and the swedish government.

**DESPOUILLE**, in heraldry, the whole case, skin, or slough of a beast, with the head, feet, tail, and all appurtenances, so that being filled and stuffed, it looks like the intire creature.

**DESPUMATION**, a term sometimes used for the clarifying a liquor, by the skimming off its froth. See **CLARIFICATION**.

**DESQAMATION**, the same with exfoliation. See **EXFOLIATION**.

**DESSAW**, a city of upper Saxony, in Germany, situated on the river Elbe, sixty miles north-west of Dresden, and subject to the prince of Anhalt Dessaw: east long.  $12^{\circ} 40'$ , north lat.  $51^{\circ} 50'$ .

**DESSERT**, or **DESART**, a service of fruits and sweet-meats, usually served up last to table.

**DESSICCATIVE**, or **DESICCATIVE**, in pharmacy, an epithet applied to such topical medicines as dry up the humours flowing to a wound or ulcer. See the article **WOUND**.

**DISTILLATION**, or **DISTILLATION**. See the article **DISTILLATION**.

**DESTINIES**, in mythology, the same with parcae. See the article **PARCÆ**.

**DESTINY**, among philosophers and divines, the same with fate. See **FATE**.

**DESTRUCTION**, in general, an alteration of any thing from its natural state to one contrary to nature; whereby it is deemed the same with corruption. See the article **CORRUPTION**.

A chemical destruction, or corruption, is nothing but a resolution of the whole naturally mixt body into its parts.

DELU.

**DESUDATION**, in medicine, a profuse and inordinate sweat, succeeded by an eruption of pustules, called sudamina, or heat-pimples. See the articles **SUDAMINA** and **HIDROA**.

**DESULTOR**, in antiquity, a vaulter, or leaper, who, leading one horse by the bridle, and riding another, jumped from the back of one to the other, as the custom was after they had run several courses, or heats.

This practice required great dexterity, being performed before the use of either saddles or stirrups. The custom was practised in the army, when necessity required it; but chiefly among the Numidians, who always carried two horses, at least, with them for that purpose, changing them as they tired. The Greeks and Romans borrowed the practice from them, but only used it at races, games, &c. The Sarmatæ were great masters of this exercise, and Hussars have still some remains of it.

**DETACHED PIECES**, in fortification, are such out-works as are detached, or at a distance from the body of the place; as demilunes, ravelines, bastions, &c. In painting, the figures are said to be well detached, when they stand free and disengaged from each other.

**DETACHMENT**, in military affairs, a certain number of soldiers drawn out from several regiments or companies equally, to be employed as the general thinks proper, whether on an attack, at a siege, or in parties to scour the country.

A detachment of two or three thousand men, is a command for a brigadier; eight hundred, for a colonel; four or five hundred, for a lieutenant-colonel. A captain never marches on a detachment with less than fifty men, a lieutenant, an ensign, and two serjeants. A lieutenant is allowed thirty, and a serjeant; and a serjeant ten or twelve men. Detachments are sometimes made of intire squadrons and battallions.

**DETENTS**, in clock-work, are those stops, which, by being lifted up or let down, lock or unlock the clock in striking. See the article **CLOCK-WORK**.

**DETENT-WHEEL**, or **HOOP-WHEEL**, in a clock, that wheel which has a hoop almost round it, wherein there is a vacancy at which the clock locks.

**DETERGENTS**, *detergentia*, in pharmacy, such medicines as are not only softening and adhesive, but also, by a peculiar activity, conjoined with a suitable

configuration of parts, are apt to abrade, and carry along with them such particles, as they lay hold on in their passage.

Medicines of this kind are supposed to cleanse, and fill up with new flesh, all ulcerations and foulnesses occasioned thereby, whether internal or external. To do this internally, the medicine is supposed to maintain its primary properties, till it arrives at the place of action, where it is intitled to the appellation of a detergent and vulnerary, by its adhesive quality, which consists in the comparative largeness of its surface, and flexibility of its component parts: for by this it readily adheres to the slough of ulcerous exudations, which are easily carried along with the medicine; and when this is done, what was instrumental in detaching, will afterwards stick to the cutaneous filaments, till, by the protrusion of proper nourishment, the ulcer is healed; and, in like manner, the operation of external substances are accounted for: only this is to be taken notice of, that internally whatsoever mixes with the animal fluids, will be the first separated and left behind; for all those parts which are specifically heaviest, will move nearest the axis of the canals, because their momenta are greatest, and will carry them nearly in a straight line: but the lighter parts will be always jostled to the sides, where they soonest meet with out-lets, or are struck into the eroded cavities, in which they adhere and make part of the substance. Thus it is easy to conceive how an increase of those qualities of activity and adhesion may make a medicine arise to the greatest efficacy in this respect, even so far, as to fetch off the membranes and capillary vessels. *Quincy*.

**DETERIORATION**, the impairing or rendering a thing worse: it is just the reverse of melioration. See the article **MELIORATION**.

**DETERMINATE PROBLEM**, in geometry, that which has but one, or, at least, a limited number of answers: as the following problem, which has but one only solution, *viz.* To describe an isosceles triangle on a given line, whose angles at the base shall be double that at the vertex. But the following hath two solutions, *viz.* To find an isosceles triangle, whose area and perimeter are given.

A determinate problem may be either simple or linear, plain, solid, or surfolid.

**DETERMINATION**, in mechanics, signifies much the same with the tendency or direction of a body in motion. See the articles **DIRECTION** and **MOTION**.

**DETERMINATION**, among school-divines, is an act of divine power, limiting the agency of second causes, in every instance, to what the deity predestinated concerning them. See **PREDESTINATION**.

Such a determination the Thomists, and other predestinarians, maintain necessary to all the actions of natural agents, particularly mankind. The Jesuits, on the other hand, deny such a determination, as supposing it inconsistent with liberty and free-will. See the articles **LIBERTY** and **FREE-WILL**.

**DETERATION**. See the article **BARE-ING of trees**.

**DETERSIVES**, in pharmacy, the same with detergents. See **DETERGENTS**.

**DETHMOLD**, a town of Westphalia, in Germany, fifteen miles north of Paderborn : east long.  $8^{\circ} 35'$ , north lat.  $52^{\circ}$ .

**DETINUE**, in law, a writ or action that lies against one who has got goods or other things delivered to him to keep, and afterwards refuses to deliver them. In this action the thing detained is generally to be recovered, and not damages; though, if a person cannot recover the thing itself, he shall recover the damages, and also for the detainer. The nature of a thing must continue without any alteration, to intitle this action: besides, it is necessary that the thing detained be known; therefore it does not lie for money out of a bag, corn out of a sack, &c. Where goods are delivered to a person, and he delivers them over to another, action of detinue may be had against the second person; and notwithstanding he deliver the things to a person who has a right to the same, yet he is chargeable. If the person to whom a thing is delivered happen to die, action of detinue lies against his executors, &c. A man may have a general detinue against another that finds his goods; but if before the owner brings his action, the finder sells them, or they are recovered from him on an execution, &c. he cannot have detinue.

**DETINUE of charters**. An action for detinue lies for deeds and charters which make the title to lands. An heir, in case of disseisin, may have a detinue of charters, though he has not land. If in this action the issue be upon the detinue, and

it is found by jury that the defendant hath burnt the charters, the plaintiff shall have judgment to recover the lands in damages.

**DETINUE of goods in frank marriage**, is had after a divorce between a man and his wife, for her to recover the goods given with her in marriage.

**DETONATION**, in chemistry, the noise and explosion which any substance makes upon the application of fire to it. It is also called **fulmination**. See the article **FULMINATION**.

**DETRAHENS QUADRATUS**, in anatomy, a muscle otherwise called **platysma**. See the article **PLATYSMA**.

**DETRANCHE**, in heraldry, a line bendwise, proceeding always from the dexter side, but not from the very angle, diagonally athwart the shield.

**DETTANDER**, or **DITTANDER**, in botany. See the article **DITTANDER**.

**DETTINGEN**, a village of Germany, about nine miles east of Hanau, in the circle of the upper Rhine: east long.  $8^{\circ} 45'$ , and north lat.  $50^{\circ} 8'$ .

**DEVA**, a port-town of Spain, situated on the bay of Biscay, forty miles east of Bilboa: west long.  $2^{\circ} 10'$ , and north lat.  $43^{\circ} 20'$ .

**DEVASTAVIT**, or **DEVASTAVERUNT**, **BONA TESTATORIS**, in law, a writ which lies against executors or administrators for wasting the testator's goods, or paying debts upon simple contracts before debts on bonds, and other specialities; also for paying legacies before debts; and, generally, for squandering the effects of the deceased, and not paying his debts.

**DEVENERUNT**, in law, a writ which lay formerly on the death of the heir of the king's tenant, and directed to the escheator; commanding him to inquire by the oaths of good and lawful men, what lands and tenements came to the king by the death of the tenant.

**DEVENSHRING**, or **DENSHRING**, a term used in many parts of the kingdom for burning of land. See **BURNING of land**.

**DEVENTER**, a city of the united Provinces, and province of Overysse, about eight miles north of Zutphen: east long.  $6^{\circ}$ , and north lat.  $52^{\circ} 20'$ .

**DEVESTING**, in old law-books, the reverse of investing or investiture. See the article **INVESTITURE**.

**DEVIATION**, in old astronomy, signified the motion of the deferent or excentric, whereby



whereby it advanced to, or receded from, the ecliptic. *Harris.*

**DEVICE**, or **DEVISE**, among painters. See the article **DEVISE**.

**DEVIL**, *δαιμόνιον*, an evil angel, one of these celestial spirits, cast down from heaven, for pretending to equal himself with God. The Ethiopians paint the devil white, to be even with the Europeans who paint him black. There is no mention of the word devil in the old Testament, but only of the word Satan and Belial: nor do we meet with it in any heathen authors, in the sense it is taken among christians, that is, as a creature revolted from God. Their theology went no farther than to evil genii, or dæmons. See the articles **GENII** and **DEMONS**.

Some of the american idolaters have a notion of two collateral, independent beings, one of whom is good, and the other evil; which last they imagine has the direction and superintendence of this earth, for which reason they chiefly worship him: whence those that give us an account of the religion of these savages give out, with some impropriety, that they worship the devil. The Chaldeans, in like manner, believed both a good principle and an evil one, which last they imagined was an enemy to mankind.

Isaiah, speaking, according to some commentators, of the fall of the devil, calls him Lucifer, from his former elevation and state of glory: but others explain this passage of Isaiah in reference to the king of Babylon, who had been precipitated from his throne and glory. The Arabians call Lucifer, Eblis, which some think is only a diminutive or corruption of the word Diabolus. See the articles **LUCIFER** and **EBLIS**.

**DEVIL-IN-A-BUSH**, a plant called by authors *nigella*. See the article **NIGELLA**.

**DEVIL'S BIT**, the same with the scabious of botanists. See the article **SCABIOUS**.

**DEVIL'S MILK**, a species of tithymal, or spurge. See the article **TITHYMAL**.

**DEVINCTION**, in antiquity, a kind of love-charm, described by Virgil in his eighth eclogue: it consisted in tying certain knots, and repeating a formula of words.

**DEVISE**, or **DEVICE**, in heraldry, painting, and sculpture, any emblem used to represent a certain family, person, action, or quality; with a suitable motto, applied in a figurative sense. See **MOTTO**. The essence of a devise consists in the metaphorical similitude between the things

representing and represented: thus a young nobleman, of great courage and ambition, is said to have borne for his devise, in the last carrousal at the court of France, a rocket mounted in the air, with this motto in italian, *poco duri purché m'inalzi*; expressing, that he preferred a short life, provided he might thereby attain to glory and eminence.

The Italians have reduced the making devises into an art, some of the principal laws of which are these: 1. That there be nothing monstrous or extravagant in the figures. 2. That figures be never joined which have no relation or affinity to each other; excepting some whimsical unions established in antient fables, which custom has authorised. 3. That the human body be never used. 4. The fewer the figures, the better. 5. The motto should be every way suitable.

**DEVISE** is frequently also used for cypher. See the article **CYPHER**.

**DEVISE**, in law, the act whereby a person bequeaths his lands or tenements to another, by his last will and testament.

The person who makes this act, is called the devisor, and he in whose favour the act is made, is termed in law the devisee. The law interprets the words of a will in a larger and more favourable sense than those of a deed: for if land be devised to a man to have to him for ever, or to have to him and his assigns, in those cases the devisee shall have a fee-simple; yet if given in the same manner by feoffment, grant, or gift, he shall have but an estate for life: so if one devise land to an infant in his mother's belly, it is a good and valid devise, though it is otherwise by feoffment, grant or gift; for in those cases, there ought to be one of ability to receive presently, otherwise it is void. See **DEED** and **WILL**.

**DEVISES**, a borough-town in Wiltshire, eighteen miles north-west of Salisbury: west long.  $2^{\circ} 6'$ , and north lat.  $51^{\circ} 25'$ . It sends two members to parliament.

**DEUNX**, in roman antiquity, eleven ounces, or  $\frac{1}{12}$  parts of the libra. See **LIBRA**.

**DEVOLVED**, something acquired by right of devolution.

**DEVOLUTION**, in law, a right acquired by succession from one to another. See the articles **INHERITANCE**, **HEIR**, **SUCCESSOR**, &c.

**DEVONSHIRE**, a county in the west of England, bounded by the Bristol channel, on the north; by Somersetshire and Dorsetshire, on the east; by the english channel,

channel, on the south ; and by Cornwall, on the west. From this county the noble family of Cavendish take the title of duke.

**DEVOTION**, *devotio*, a sincere ardent worship of the deity. See **PRAYER**, **ADORATION**, **WORSHIP**, &c.

Devotion, as defined by Jurieu, is a softening and yielding of the heart, with an internal consolation, which the souls of believers feel in the practice or exercise of piety. By devotion is also understood certain religious practices, which a person makes it a rule to discharge regularly, and with reason, if the exactitude be founded on solid piety, otherwise it is vanity or superstition. That devotion is vain and trifling, which would accommodate itself both to God and to the world. *Trevoux.*

**DEVOTION**, among the Romans, was a kind of sacrifice, or ceremony, whereby they consecrated themselves to the service of some person. The antients had a notion, that the life of one might be ransomed by the death of another, whence those devotions became frequent for the lives of the emperors. Devotion to any particular person, was unknown among the Romans till the time of Augustus. The very day after the title of Augustus had been conferred upon Octavius, Pacuvius, a tribune of the people, publicly declared, that he would devote himself to Augustus, and obey him at the expence of his life, as was the practice among barbarous nations, if he was commanded. His example was immediately followed by all the rest, till, at length, it became an established custom never to go to salute the emperor, without declaring that they were devoted to him. Before this, the practice of the Romans was that of devoting themselves to their country. The devotion of Decius, who, after devoting himself to his country, threw himself into the hands of his enemies and was killed, is said to have gained the Romans the victory.

**DEVOURING**, in heraldry, is when fishes are borne in an escutcheon in a feeding posture, for they swallow all the meat whole.

**DEUS**, **GOD**, among divines and philosophers. See the article **GOD**.

**DEUTERO-CANONICAL**, in theology, a term applied to certain books of scripture which were added to the canon after the rest ; either because they were

not wrote till after the canon was compiled, or because of some debate in regard to their canonicity.

The Jews undoubtedly acknowledge several books in their canon which were put there later than the rest. They alledge, that under Esdras, a great assembly of their doctors, which, by way of eminence, they term the great synagogue, collected the holy books, which now compose the hebrew old Testament : and they allow, that this assembly put books therein, that had not been in it before the babylonish captivity. Such are those of Daniel, Ezekiel, Haggai, &c. and the books of Esdras and Nehemiah.

The church of Rome added, since then, others to the canon that were not in the canon of the Jews, nor could be there, by reason some of them were not composed till after : such are the books of Ecclesiasticus, with several of the apocryphal books ; as those of the Maccabees, Wisdom, &c. Others were added still later, by reason their canonicity had not been examined ; and till such examen and judgment, they might be set aside at pleasure.

The deutero-canonical books in the modern canon, are the books of Esther, either the whole, or, at least, the seven last chapters of it ; the epistle to the Hebrews, those of James and Jude ; the second of St. Peter, the second and third of St. John, and the Revelations. The deutero-canonical parts of books are the hymn of the three Children, the prayer of Azariah, the histories of Susannah, of Bel and the Dragon, the last chapter of St. Mark, the bloody sweat and appearance of the angel, related in Luke xxii. and the history of the adulterous woman in John viii. *Trevoux.*

**DEUTERONOMY**, a canonical book of the old Testament, and the last of the pentateuch of Moses. See the articles **BIBLE**, **CANON**, and **PENTATEUCH**.

This book was called Deuteronomy by the seventy greek translators, as being a recapitulation of the laws before delivered at large.

**DEUTEROPOTMI**, *δευτεροποτμοι*, in grecian antiquity, a designation given to such of the Athenians as had been thought dead, and, after the celebration of the funeral rites, unexpectedly recovered. It was unlawful for the deuteropotmi to enter into the temple of the Eumenides, or to be admitted to the holy rites, till after they were

were purified, by being let through the lap of a woman's gown, that they might seem to be new born.

**DEUTEROSIS**, the greek name by which the Jews called their mischnah, or second law. See the article **MISCHNAH**.

Eusebius accuses the Jews with corrupting the true sense of scripture with the trifling explanations of their deuterosis. Epiphanius says, that there were four sorts of these quoted: the first under the name of Moses, the second under that of Akiba, the third under that of Adda, or Judah, and the fourth under the name of the sons of the Asmonæans, or Maccabees. It is not easy to say, whether the present Mischnah is the same with any of these; whether it contains them all, or only some part, or whether it be different from them all. St. Jerom says, that the Hebrews referred their deuterosis to Shammai, and Hillel; he speaks of the deuterosis with the utmost contempt; he looked upon them as a collection of fables, childish stuff, and obscenities.

**DEUIDER**, in the manege, is applied to a horse that, upon working upon volts, makes his shoulders go too fast for the croupe to follow; so that, instead of going upon two heads as he ought, he endeavours to go only upon one. This comes from the resistance he makes in defending against the heels; or from the fault of the horseman, who is too hasty with his hand.

**DEUX PONTS**, a city of Germany, in the palatinate of the Rhine, sixty miles north east of Nancy: east long.  $7^{\circ} 15'$ , and north lat.  $49^{\circ} 25'$ .

**DEW**, a dense moist vapour, falling on the earth in form of a misting rain, while the sun is below the horizon. In the summer-season, when the weather is fair and very dry, and the earth's surface has, for a considerable time, been parched with the great heat of the sun, then, not only the watery, but likewise other less volatile particles, as the oily and saline, are, by the power of the solar rays, carried up into the air, and fill that part of it which lies nearest to the surface of the earth; and so long as these exhalations are kept in agitation by the heat of the sun, so long nothing of them appears to the eye: but as soon as the solar heat, which at three in the afternoon is the greatest, begins to remit, the air not long after begins to grow cool, though the earth, which retains the heat

communicated to it by the sun a thousand times longer than the air, being still hot, continues to exhale the agitated corpuscles: by which means there is collected a white, dense, vapour, which is cool above, but still continues warm below. This vapour therefore appears first in ditches, and watery or marshy places, whence dispersing itself by degrees, it covers the face of the earth, in the evening and night-time, with a cloud, consisting of this kind of particles, which in the morning is again dissipated by the heat of the rising sun. By this it appears, that dew is a very compound liquid, so that nothing can be asserted of its nature, which in every circumstance would hold true. In gravel-pits, for instance, and in high, dry, healthy grounds of a large extent, there is collected but a very small quantity of this vapour, and that almost intirely watery; whilst that which is collected about standing waters, fens, marshes, and fat bituminous grounds, abounding with putrified fish, and other animals, is of a quite different nature, and very often pernicious to mankind: whence it is no wonder that chemists, in their analysing of dew, should find such different results, that scarce any two are agreed about them: some dew, that had been collected in a certain part of the earth, has afforded a liquor, by distillation, which struck the colours of the rainbow upon glass, so strong as not to be effaced by friction, alkaline lixiviums, or aqua regia: it also burnt like spirit of wine: again some distilled dew, having been digested with a gentle heat for eight days, and then rectified six times over, till it was exceeding subtle, is reported to have broke three glass vessels successively, though it still remained perfectly insipid: again some dew is described to be like a yellowish butter, that melts by being rubbed upon the hand, yet grows hard and dry with a moderate heat, being of a fetid odour, and to be found in pretty large lumps in the night, especially in the spring and winter. The nature of dew also differs surprizingly with the different seasons of the year, and the various successions of meteors: hence, exceedingly small seeds of vegetables, and invilible eggs of minute animals, with numerous other things coming to be digested, fermented, or putrified therein, it must afford many very different productions by distillation: whence

chemists

chemists have formed very odd opinions about it.

**DEW-BORN**, in country affairs, a distemper in cattle, being a swelling in the body, as much as the skin can hold, so that some beasts are in danger of bursting. This distemper proceeds from the greediness of a beast to feed, when put into a rank pasture: but commonly when the grass is full of water. In this case the beast should be stirred up and down, and made to purge well: but the proper cure is bleeding in the tail; then take a grated nutmeg, with an egg, and breaking the top of the shell, put out so much of the white as you may have room to slip the nutmeg into the shell; mix them together, and then let shell and all be put down the beast's throat; that done, walk him up and down, and he shall soon mend.

**Sun-DEW**, *ros solis*, in botany. See the article *ROS SOLIS*.

**DEX**, in zoology, the same with thrips. See the article *THRIPS*.

**DEXTANS**, in roman antiquity, ten ounces, or  $\frac{1}{2}$  of their libra. See the article *LIBRA*.

**DEXTER**, in heraldry, an appellation given to whatever belongs to the right side of a shield, or coat of arms: thus we say, bend-dexter, dexter-point, &c. See the articles *BEND*, *POINT*, &c.

**Ambo-DEXTER**, or **AMBIDEXTER**. See the article *AMBIDEXTER*.

**DEXTROCHERE**, or **DESTROCHERE**, in heraldry, is applied to the right arm painted in a shield, sometimes naked, sometimes clothed, or adorned with a bracelet; and sometimes armed, or holding some moveable, or member used in the arms.

**DEY**, in matters of government, the sovereign prince of Algiers, answering to the bey of Tunis. See the article *BEY*.

**DEYNSE**, a town of Flanders, nine miles south west of Ghent: east long.  $3^{\circ} 30'$ , north lat.  $51^{\circ}$ .

**DIA**, *dia*, the beginning of several terms in medicine, pharmacy, surgery, &c. Where these three letters commence the name of a remedy, unguent, plaster, &c. they signify composition and mixture, as *diaplasma*, &c.

**DIA** is also the beginning of many terms in the other arts, as diameter, dialogue, &c. See the article *DIAMETER*.

**DIABE**, a species of hystrix, or porcupine-fish. See the article *HISTRIX*.

**DIABETES**, *diacetes*, in physic, an excessive discharge of urine, which comes away crude, and exceeds the quantity of liquids drank.

It proceeds from weakness of the kidneys, which are too feeble and lax, especially in those who have been accustomed to drink too much.

Lifter observes, that a diabetes comes slowly on, and is a long while a breeding. In the beginning the mouth is dry, and the spittle a little white and frothy; the urine being somewhat more than usual, with a small thirst. A heat begins to be perceived in the bowels, which is a little pungent; the patient falls away, and the mind is anxious and unstable. In time the thirst greatly increases, the urine is plentiful, and the body wastes: when they make water, without intermission, the thirst is intolerable, and though much is drank, it is not proportionable to the water; when the urine is retained a little while, there is a swelling of the loins, illia, and testes, and it comes away with pain. Now death is at hand. The urine is pale, and not sweet, but more sweetish at last than at first.

Sydenham observes, that the juices brought into the blood go off by urine: whence the strength gradually fails, the body wastes, and its substance is drained away: there is a thirst, heat of the bowels, &c.

Strengtheners, moderate aftringents, and a species of hyacinth, with crocus martis, are good in this disease, especially with anodynes: or japan earth; or the tincture of vitriol of mars; and red wine; with water in a small quantity: the drink should be sparing, and all excesses avoided exercise and friction of the body are useful.

Lifter says, almonds and a milk-diet are proper in this distemper; as also, wine with ginger, allowing in the mean time a draught of milk and water to allay the thirst.

Wallis prescribes tincture of antimony and lime water, with saffras, aniseeds, raisins, or liquorice. Bristol-water is reckoned excellent upon these occasions: but Morgan says, that the tincture of cantharides is a medicine that may almost be depended on for checking, restraining, and stopping the immediate flux of urine.

**DIABOLUS**, *diabolos*, the devil. See the article *DEVIL*.

**DIABOLUS**

**DIABOLUS MARINUS**, the SEA-DEVIL, a name given by some authors to a species of ray fish, with a bifid-snout, and of a very ugly appearance. See the article **RAIA**.

**DIABOLUS METALLORUM**, a title given by chemists to jupiter or tin, because when incorporated with other metals, it renders them incapable of reduction, or at least very difficult to undergo that operation.

**DIABOTANUM**, in pharmacy, a plaister prepared of herbs described by Galen, *De C. M. P. G. lib. vi. c. 2.* It resolves and dissolves wens.

**DIABROSIS**, in medicine, the same with anabrosis. See the article **ANABROSIS**.

**DIACARTHAMI**, in pharmacy, an electuary composed of some purgatives with the addition of the pulp of the seed of carthamus, formerly mixed in medicines along with other purgatives, but now wholly out of use.

**DIACARYON**, in pharmacy, the same with dianucum. See **DIANUCUM**.

**DIACAUSTIC CURVE**, a specie of the caustic curves formed by refraction. Thus if you imagine an infinite number of rays BA, BM, BD, &c. (plate LXX. fig. 1.) issuing from the same luminous point B to be refracted to or from the perpendicular MC, by the given curve AMD, and so, that CE, the lines of the angles of incidence CME, be always to CG, the lines of the refracted angles CMG, in a given ratio, then the curve HFN, which touches all the refracted rays, is called the diacaustic, or caustic by refraction. See the article **CAUSTIC CURVE**.

**DIACELTATESSON**, in chemistry, a name given by Van Helmont, to a purging preparation procured from the fixed flowers of antimony. It is said by its author to cure all intermittent and continued fevers. It is to be given without any acid, and if it operate too violently, the violence may be stopped by taking any thing acid. Boerhaave observes, that he had often given it with good success, but never with those effects which the author ascribes to it, who says, that it radically cures the gout and fevers, heals ulcers of the larynx, œsophagus and bladder, and purges the body when in perfect health, but not otherwise.

**DIACENTROS**, a term used by Kepler, for the lesser diameter of a planet's orbit.

**DIACHALASIS**, among antient physicians, signifies the recess of the bones of

the cranium, or the opening of its sutures, frequently owing to wounds.

**DIACHALCITIS**, in surgery and pharmacy, a plaister composed of oil, axungia, and chalcitis, which formerly used to be applied after the amputation of a cancer, and on many other occasions.

**DIACHYLON**, in pharmacy, an emollient digestive plaister, composed of mucilages or viscid juices drawn from certain plants. See **MUCILAGE**.

There are several plaisters described by dispensatory writers under the name of diachylon, but the following are those ordered by the college of physicians.

1. Simple diachylon, compounded of fine oil, litharge of gold, the mucilages of fenugreek, linseeds, and marshmallow roots. 2. Diachylon magnum, the greater diachylon, made of the mucilages of raisins, figs, marshmallow roots, fenugreek, and linseeds, birdlime, of the juices of orrice and squills, of oesypus, of the oils of orrice, camomile and dill, of litharge of gold, of turpentine, of rosin of the pine-tree, and of yellow wax. 3. Diachylon magnum cum gummi, the great diachylon with gums, which consists of the former with the addition of strained galbanum, bdellium, sagapenum, and ammoniacum. 4. Compound diachylon or the mucilage plaister, composed of yellow wax, the oil of mucilages, gum ammoniac, and common turpentine.

**DIACODIUM**, in pharmacy, a syrup prepared from poppy heads. It is also called the *syrupus de meconio*. As it is of consequence that all the circumstances in the directions for compounding this medicine, be exactly followed, we here give the method of preparing it from the London Dispensatory. Take of the heads of dried white poppies without their seeds, three pounds and a half, of water six gallons. Slice the heads and boil them in the water, often stirring them that they may not burn, till about a third only of the liquor is left, which will be almost all imbibed by the poppy heads: then take all from the fire, and press the liquor strongly out from the heads: in the next place, boil the liquor by itself, to about two quarts, and strain it while hot, first through a sieve, and then through a thin flannel: set it by for a night, that what faeces have passed the strainers, may subside, next morning pour off the clear liquor, and boil it with six pounds of double refined sugar,

till the whole comes to the weight of nine pounds, or a little more, that it may become a syrup of a just consistence. This syrup partakes of all the virtues of the poppy. See the article **POPPY**.

**DIACODUS**, among antient writers, a name given to a kind of beryl, or sapphire, of which many fabulous things are related.

**DIACONATE**, **DIACONISSA**, the office of a deacon. See the article **DEACON**.

**DIACONICON**, in church history, an apartment answering to our vestry. See the article **VESTRY**.

**DIACOPE**, in grammar, the same with tmesis. See the article **TMESIS**.

**DIACOUSTICS**, called also **DIAPHONICS**, the consideration of the properties of refracted sound, as it passes through different mediums. See **SOUND**.

**DIACRII**, in grecian antiquity, an appellation given to a faction at Athens, who favoured oligarchy; in opposition to the *pediaci*, who were for a pure democratical government.

**DIACYDONITES**, in pharmacy, a term applied to these remedies where quinces are a principal ingredient.

**DIADELPHIA**, in the linnæan system of botany, a class of plants, the seven-teenth in order; comprehending all those with papilionaceous and hermaphrodite flowers, and leguminous seed-vessels. See **PAPILIONACEOUS** and **LEGUMEN**. The distinguishing characteristic of this class is, that the stamina adhere together; forming two dissimilar bodies or filaments, the one standing above the pistil, and the other surrounding it. See plate XXX. fig. 17.

The lower part of this last is membranaceous, and of a cylindrical figure, only open above; but towards the top, it is divided into several tubulated bodies, whereof those in the middle are alternately longer and shorter by pairs. The upper filament is single, altogether tubulated, and covers the slit of the cylindrical part of the under one. Add to this, that the pistil is single; its germ oblong, and rounded; its style, tubulofiliform; and the stigma covered with down, of the length of the style, and lying directly below the antheræ of the stamina. This is a very natural class, and comprehends pease, beans, vetches, liquorice, and a great many other genera. See the articles **PEASE**, **BEANS**, &c.

**DIADEM**, in antiquity, a head band, or fillet, worn by kings, as a badge of

their royalty. It was made of silk, thread, or wool, and tied round the temples and forehead, the ends being tied behind, and let fall on the neck. It was usually white, and quite plain, tho' sometimes embroidered with gold, and set with pearls and precious stones. In latter times, it came to be twisted round crowns, lawrels, &c. and even appears to have been worn on divers parts of the body. See **CROWN**.

**DIADEM**, in heraldry, is applied to certain circles, or rims, serving to inclose the crowns of sovereign princes, and to bear the globe and cross, or the flower de luces for their crest. The crowns of sovereigns are bound, some with a greater, and some with a less number of diadems. The bandage about the heads of moors on shields is also called **diadem**, in blazoning.

**DIADROME**, the same with vibration, or swing of a pendulum. See the articles **VIBRATION** and **PENDULUM**.

**DIÆRESIS**, in surgery, an operation serving to divide and separate the part when the continuity is a hindrance to the cure. Some professors divide surgery into six parts, assigning to each greek names, of which *diæresis* is one.

**DIÆRESIS**, in medicine, is the consuming of the vessels of an animal body, when from some corroding cause certain passages are made, which naturally ought not to have been; or certain natural passages are dilated beyond their ordinary dimensions, so that the humours which ought to have been contained in the vessels extravasate or run out.

**DIÆRESIS**, in grammar, the division of one syllable into two, which is usually noted by two points over a letter, as *aulai* instead of *aulæ*, *disfoluendæ* for *dissolvendæ*.

**DIÆRESIS** is also the same with what is otherwise called tmesis. See **TMESIS**.

**DIÆTETÆ**, in grecian antiquity, a kind of judges, of which there were two sorts, the *cleroti* and *diallasterii*. The former were public arbitrators, chosen by lot to determine all causes exceeding ten drachms, within their own tribe, and from their sentence an appeal lay to the superior courts.

The *diallasterii*, on the contrary, were private arbitrators from whose sentence there lay no appeal, and accordingly they always took an oath to administer justice without partiality.

**DIAGLAUCIUM**, the name of a collyrium, recommended by Scribonius Largus, for beginning lippitudes and ophthalmics. See the composition in the above-mentioned author, n° 22.

**DIAGLYPHICE**, the art of cutting or engraving figures on metals, such as seals, intaglias, matrices of letters, &c. or coins for medals. See the articles **ENGRAVING** and **SCULPTURE**.

**DIAGNOSTIC**, in medicine, a term given to those signs which indicate the present state of a disease, its nature and cause. There are two principles upon which the diagnosis of diseases is founded: the first depends on a knowledge of the preceding causes, which are such as appear to have produced the same disease before: and the second is a knowledge of the disease in its own nature, and present effects. To the diagnosis of fevers, belongs the knowledge of their various stages or times, as distinguished into beginning, increase, height and declension.

**DIAGONAL**, in geometry, a right line drawn across a quadrilateral figure, from one angle to another, by some called the diameter, and by others, the diametral of the figure. Thus *a b* in plate LXX. fig. 2. is called a diagonal. It is demonstrable, 1. That every diagonal divides a parallelogram into two equal parts. 2. That two diagonals drawn in any parallelogram bisect each other. 3. A line *f g*, passing through the middle point of the diagonal of a parallelogram, divides the figure into two equal parts. 4. The diagonal of a square is incommensurable with one of its sides. 5. That the sum of the squares of the two diagonals of every parallelogram is

equal to the sum of the squares of the four sides. This proposition is of great use in the theory of compound motions; for, in an oblique angled parallelogram, the greater diagonal being the subtense of an obtuse, and the lesser of an acute angle which is the compliment of the former, if the obtuse angle be conceived to grow till it be infinitely great with regard to the acute one, the great diagonal becomes the sum of the two sides, and the lesser one, nothing. Now two contiguous sides of a parallelogram being known, together with the angle they include, it is easy to find one of the diagonals in numbers, and then the foregoing proposition gives the other. This second diagonal is the line that would be described by a body impelled at the same time by two forces which should have the same ratio to each other, as the contiguous sides have, and act in those two directions; and the body would describe this diagonal in the same time, as it would have described either of the contiguous sides in, if only impelled by the force corresponding thereto. See the article **COMPOUND MOTION**.

**DIAGRAM**, in geometry, a scheme for explaining and demonstrating the properties of any figure, whether triangle, square, circle, &c. See the articles **TRIANGLE**, **SQUARE**, &c.

**DIAGRAM**, among antient musicians, the same with the scale of the moderns. See the article **SCALE**.

Its utmost extent was only two octaves; the lowest note being to the highest as 1 to 4. Within this compass, they had eighteen notes or sounds; the names of which, beginning with the lowest, are these:

Proslambanomenos, answering to our A

Hypate hypaton

Parypate hypaton

Lichanos hypaton

Hypate meson

Parypate meson

Lichanos meson

Mese

Paramese

Trite diezeugmenon

Paranete diezeugmenon

Nete diezeugmenon

Trite hyperbolæon

Paranete hyperbolæon

Nete hyperbolæon

B $\eta$

C

D

E

F

G

a

b $\beta$

b $\eta$

c

d

e

f

g

aa

Mese

Trite synemmenon

Paranete synemmenon

Nete synemmenon

This diagram, it is to be observed, represents only the diatonic genus, where the notes or sounds are by no means distinct, the paranete synemmenon coinciding with the trite diezeugmenon, and the nete synemmenon with the paranete diezeugmenon. It is also observable, that some of the notes stand nearer together than the rest; the interval between the latter being a tone, and between the former only a semitone. See the article INTERVAL.

**DIAGRYDIUM**, in pharmacy, a preparation of scammony, invented by Galen: it consists in baking the scammony in a quince, but is at present seldom used, the scammony being found not to need any correction. See the article SCAMMONY.

**DIAHEXAPLA**, or **DIAHEXAPTE**, among farriers, a compound medicine, so called from its containing six ingredients, *viz.* birthwort and gentian roots, juniper-berries, bay-berries, myrrh, and ivory shavings. It is commended for colds, consumptions, purinsels, and many other disorders in horses.

**DIAL**, or **SUN-DIAL**, an instrument serving to measure time by means of the shadow of the sun.

Sun-dials are differently denominated, according to their different situation, and the figure of the surfaces upon which they are described, as horizontal, vertical, equinoctial, polar, direct, erect, declining, inclining, reclining, cylindrical, &c. We shall here proceed to describe these particular kinds of dials; and explain the philosophical principles on which dialling is founded under the article dialling. See **DIALLING**.

Dials are distinguished into primary and secondary. The first are either drawn on the plane of the horizon, called horizontal dials; or perpendicular thereto, on the planes either of the meridian, or prime verticle, called vertical dials; to which are added those drawn on the polar and equinoctial planes, though neither horizontal nor vertical.

**Equinoctial DIAL**, is that described on an equinoctial plane, or a plane representing that of the equinoctial. They are usually distinguished into upper, which look towards the zenith, and lower which respect the nadir. Now as the sun only illumines the upper surface of an equinoctial plane, while he is in our hemisphere, or on the northern side of the equator, an upper equinoctial dial will

only shew the hour during the spring and summer season. And again, as the sun only illumines the lower surface of an equinoctial plane, while he is in the southern hemisphere, or on the other side of the equator, a lower equinoctial dial will only shew the hour in autumn and winter. To have an equinoctial dial therefore that shall serve all the year round, the upper and lower must be joined together; that is, it must be drawn on each side of the plane.

*To describe an upper equinoctial DIAL.*

From a center C (plate LXX. fig. 3. n<sup>o</sup> 1.) describe a circle ABDE, and by two diameters AD and BE, intersecting each other at right angles, divide it into quadrants AB, BD, DE and EA. Subdivide each quadrant into six equal parts by the right lines. C I, C II, C III, &c. which lines will be hour lines, and thro' the center C drive a style or pin perpendicular to the plane ABDE. The dial thus described being raised so as to be in the plane of the equator, the line C XII, in the plane of the meridian, and the point A looking towards the south; the shadow of the style will shew the hours both of the forenoon and afternoon.

*A lower equinoctial DIAL* is described in the same manner, with this exception, that no hour lines are to be drawn beyond that of six o'clock.

*To describe an universal equinoctial DIAL:*

join two metal planes ABCD and CDEF. (ibid. n<sup>o</sup> 2.) so as to be moveable at the joint. On the upper surface of the plane ABCD describe an upper equinoctial dial; and upon the lower, a lower, as already directed, and through the center I. drive a style. In the plane DEFC cut a box, and put a magnetical needle G therein; fit on the same plane a brass quadrant L H, nicely graduated, and passing through a hole H cut in the plane ABCD. Now since this may be so placed by means of the needle, as that the line I 12 shall be in the plane of the meridian, and by means of the quadrant so raised, as that the angle BCF shall be equal to the elevation of the equator, it will serve as a dial in any part of the world. On this dial may be drawn several concentric circles, which will shew the sun's place and declination. Thus divide the style into 100 parts, which being the radius of a circle, take the complement of the declination 5°, 10°, 15°, &c. and with the



Fig. 1. DIACAUSTIC

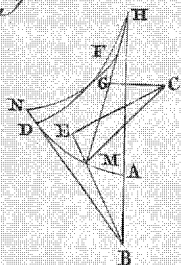
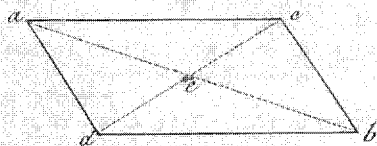
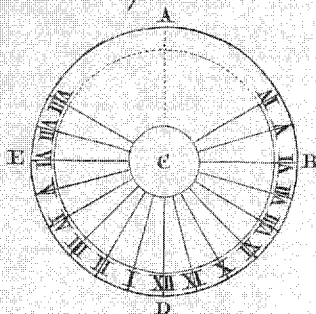
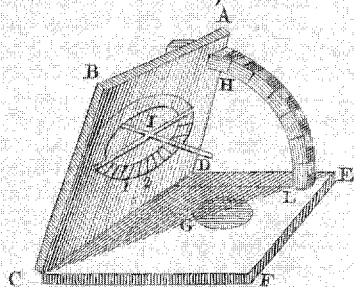
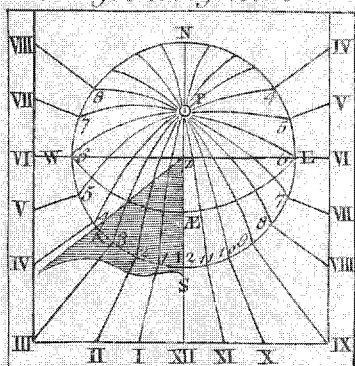
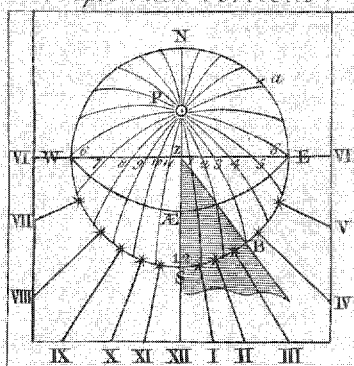
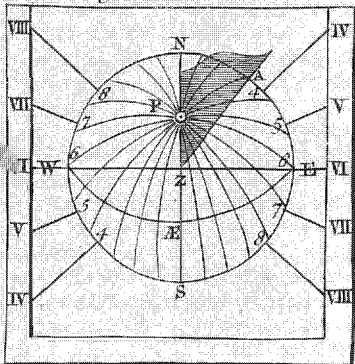
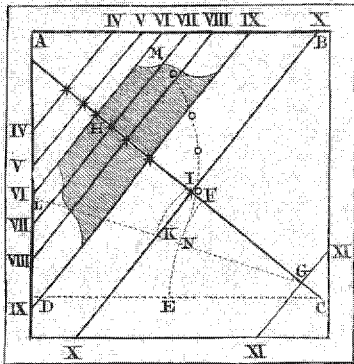


Fig. 2. DIAGONAL.

Fig. 3.  
DIALS.N.<sup>o</sup> 1. Equinoctial.N.<sup>o</sup> 2. Universal Equinoctial.N.<sup>o</sup> 3. Horizontal.N.<sup>o</sup> 4. South Vertical.N.<sup>o</sup> 5. North Vertical.N.<sup>o</sup> 6. East Vertical.



the tangent of these degrees describe concentric circles, and when the end of the shadow of the style comes into one of them, it shews the declination and the sun's place, which may be marked on the circles.

**Horizontal DIAL**, that described on a plane parallel to the horizon.

*To draw the hour lines upon an horizontal DIAL*, geometrically, draw a right line NS (ibid. n<sup>o</sup> 3.) for the meridian and hour line of 12, and cross it with another EW. for the hour line of 6 at right angles in Z: and upon Z as a center describe a circle ENWS. representing the horizon, of London for example, whose latitude is  $51^{\circ} 32'$ , and likewise this dial plane. Within this circle project the sphere according to your latitude: then shall the several hour circles touching the plane of the horizon give you points to draw the hour lines upon your dial plane. If a ruler therefore is laid to Z, and every one of the points 1, 2, 3, &c. 11, 10, 9, &c. and straight lines drawn, these lines shall be the true hour lines for your horizontal dial. There is nothing required to compleat this dial but to make the height of the style equal to the latitude of the place. Wherefore for the latitude of London take  $51^{\circ} 32'$  from your scale of chords, and set them upon the horizon from S to A, and draw a line ZA for the style. The substyle, upon which the style stands in all horizontal dials, is the meridian, or hour line of 12.

In large dials, where great accuracy is required, it is best to determine the lines of the dial by trigonometrical calculation, in which the elevation of the pole of the place being given, the angles which the hour lines make with the meridian in the center of the dial are found by the following canon. As the sine of  $90^{\circ}$ , is to the sine of the elevation of the pole or latitude of the place; so is the tangent of each hour's equinoctial distance from the meridian, to the tangent of the angle required.

**Vertical DIAL**, that drawn on the plane of a vertical circle. The verticals chiefly used are the prime vertical and the meridian, whence arise south, north, east, west dials. If the dial respects the cardinal points of the horizon, it is called *direct*, but if any other vertical be chosen, it is said to *decline*. Again, if the circle whose plane is used be perpendicular to the horizon, the dial is denominated

*erect*; but if the plane be oblique to the horizon, it is said to *incline* or *recline*.

**Erect, direct, south or north DIAL**, is that described on the surface of the prime vertical circle, looking southward or northward.

*To describe the hour lines upon a vertical erect, direct, south or north DIAL*. Having drawn a right line NS. (ibid. n<sup>o</sup> 4. and 5.) for the meridian, or line of 12, and another at right angles EW. for the horizontal line of the plane, crossing in the point Z; upon Z as a center, describe a circle NESW representing the horizon, and thereon project the sphere. Then draw a line upon your projection to represent your plane. Now an erect direct plane, which beholds the south, must needs be in the azimuth circle of east and west, and therefore a right line drawn from east to west shall represent your plane. Having drawn the plane upon the projection, you must find its pole. Now, this plane EW lying in the azimuth of east and west, its poles must lie in the azimuth of north and south, so that N is the pole of the north face of this plane, and S of the south face, either of which poles are removed 90 degrees from the plane, and a line drawn from the one pole to the other, will cut the plane at right angles in Z. The next thing to be found is the elevation of the pole of the world above the plane. Now P the pole of the world is elevated above this plane EW the quantity of the arch of the meridian ZP. To find the quantity of which, take the distance ZP in your compasses, and measure it upon the scale of half tangents, and you will find it to be equal to the complement of the latitude. Then as for the hour distances upon the plane, they are found thus. Lay a ruler to N, the pole of the plane, and to the several points 1, 2, 3, &c. 11, 10, 9, &c. where the hour circles of the projection cut the plane, and where the ruler cuts the primitive circle make small \*\*\*: and lines drawn from the center Z, through these stars, shall be the true hour lines upon the dial plane. The height of the pole above the plane being equal to the complement of the latitude, take that in degrees from a scale of chords and set them from S to B, and draw a line ZB for the style, which must stand upon the meridian, and on the south face must point downwards to the south pole,

pole, and on the north face upwards to the north pole, as in n° 5.

To draw this dial trigonometrically, say, as the radius to the co-sine of the latitude, so is the tangent of 15° the first hour's equinoctial distance, to the tangent of the first hour's distance on the plane.

*Erect, direct, east or west DIAL*, that described on the plane of the meridian, looking to the east or to the west.

*To describe an erect, direct, east or west DIAL*. Let A B C D, plate LXX. LXXI.

n° 6 and 7. be the dial plane. 1. Upon the point C at the lowermost corner, if it be an east dial, or upon the point D, at the other lowermost corner, if it be a west dial, with 60 degrees of a line of chords, describe an obscure arch of a circle E F. Then from the same line of chords take the complement of the latitude of the place, which is also the elevation of the equinoctial above the horizon; and set that distance upon the arch from E to F, and draw the line C F A quite through the plane. This line will represent the equinoctial circle. 2. That you may the better proportion your style to your plane, and that all the hours may come on, and be at a convenient distance from one another, assume two points in the equinoctial line, one towards the end of C for the hour of XI, in the east dial, or of I in the west dial, as the point G; and another towards the other end thereof, for the hour of VI, as the point H; and through these two points G and H, draw two lines at right angles to the equinoctial for the hour lines of XI and VI o'clock. 3. Upon the point G with 60 degrees of the line of chords, describe an obscure arch of a circle, below the equinoctial line, as I K, setting thereon 15° of your line of chords from I to K, and draw the obscure line G K L extending it till it cut the hour line of VI in the point L; so shall the distance L H be the height of the perpendicular style proportioned to this plane. 4. Open your compasses to 60° of your line of chords, and setting one foot in the point L with the other, describe an obscure arch of a circle M N between the hour line of VI and the line G L. 5. Divide the arch M N into five equal parts, at the points ☉ ☉ ☉ ☉ ☉, and lay a ruler from L to each of these points, and the ruler will cut the equinoctial line C H in the points \* \* \* \*, through which

points draw right lines parallel to the hour line of VI, as the lines VII \* VII, VIII \* VIII, IX \* IX, X \* X, and they will be the true hour lines of an east dial from six in the morning to eleven before noon. 6. For the hour lines before VI, namely, of IV and V in the morning, you may put them on by transferring the same distances upon the equinoctial line before VI, as there is between VI, and the hour lines of VII and VIII, after VI. and through these points draw lines parallel to the hour line of VI, and they will be the hour lines of IV and V in the morning. 7. For the style of east or west dials it may be either a straight pointed pin or wire exactly of the length of the line H L, fixed in the point H, or some other part of the line of VI, perpendicularly to the plane, which will shew the true hour only by the shadow of the very top, as in the west dial n° 7; or, which is better, it may be a plate of brass of the same breadth with the distance between the hour lines of VI and IX upon the equinoctial, as in the east dial n° 6, which plate being set perpendicularly upon the hour line of VI, will shew the hour by the shadow of the upper edge. 8. If you would insert the halves and quarters of hours, divide each space between ☉ and ☉ on the arch M N into four equal parts, and so transfer them to the equinoctial circle, as you did the whole hours. In an east and west dial every thing is the same, with this difference only, that whereas the arch E F in the east dial, through which the equinoctial passes, was described on the right hand of the plane upon the center C; in the west dial it must be described on the left hand on the center D; and the hour lines of IV, V, VI, VII, VIII, IX, X, XI in the forenoon on the east dial, must be VIII, VII, VI, V, IV, III, II, I in the afternoon on the west dial.

*Polar DIAL*, that described on a plane passing through the poles of the world, and the east and west points of the horizon, denominated *upper* or *lower*, according as it looks up towards the zenith, or down towards the nadir. It is therefore inclined to the horizon in an angle equal to the elevation of the pole.

*To draw an upper polar DIAL*. Draw a right line A B (n° 10) parallel to the horizon; and if the plane be immoveable,





able, find the meridian line CE. Divide CE into two equal parts, and thro' C draw a right line FG parallel to AB. Then from the center D, with the interval DE, describe a quadrant, which divide into six equal parts; and from the center D, through the several points of division, draw right lines D 1, D 2, D 3, D 4, D 5, and set off the intervals E 1, E 2, E 3, E 4, E 5, contrary way, viz. E 11, 10, 9, 8, 7. From the points 5, 4, 3, 2, 1, raise perpendiculars, meeting the line FG in the correspondent points. Lastly, in D erect a perpendicular style equal to DE, or on two equal pieces, E, C, fix a cross iron rod, then will 12, 12; 1, 1; 2, 2; 3, 3, &c. be hour lines to be pointed out at the proper times by the shadow of the indices. A lower polar dial is made by putting out the hours of the forenoon 9, 10, 11, and those of the afternoon 1, 2, 3, with the noon-hour 12 itself, and only leaving the hours 4 and 5 in the morning and 7 and 8 in the afternoon.

**Secondary DIAL**, that drawn on the plane of other circles than the horizon, prime vertical, equinoctial, and polar circles; or that which either declines, inclines, reclines, or deinclines.

**Declining DIALS** are erect or vertical dials, which cut either the plane of the prime vertical, or of the horizon at oblique angles. They are of very great use, as the walls of houses, upon which dials are frequently drawn, commonly deviate from the cardinal points.

*To describe a vertical DIAL, declining from the south to the east, or west, trigonometrically.* In order to do this, 1. The height of the pole or style above the plane must be found. 2. The deflexion or substyle's distance from the meridian. And 3. The plane's difference of longitude. All which are parts of the spherical triangle PRZ. ( $n^{\circ} 8.$ ) right angled at R, in which are given the side PZ, equal to the complement of the latitude of the place; the angle PZR, the complement of the plane's declination; and the right angle at R. From these three data are found, 1. The height of the style above the plane by this canon,

As the sine of  $90^{\circ}$

Is to the sine complement of the latitude,

So is the sine complement of the plane's declination

To the sine of the height of the style.

2. The distance of the substyle from the meridian by this canon.

As the sine of  $90^{\circ}$

To the sine of the plane's declination,  
So is the tangent of the complement of the latitude of the place

To the tangent of the substyle's distance from the meridian.

3. To find the plane's difference of longitude, say,

As the sine of the complement of latitude

To the sine of  $90^{\circ}$ ,

So is the sine of the substyle's distance from the meridian

To the sine of the plane's difference of longitude.

4. To find the angle that each hour makes with the substyle, say,

As the sine of  $90^{\circ}$

To the sine of the height of the pole above the plane,

So is the tangent of the difference of the sun's distance from the meridian and the difference of longitudes

To the tangent of the angle required.

An example of a north dial declining east, which is only a south dial inverted, may be seen in ( $n^{\circ} 9.$ )

**Inclined DIALS** are those delineated on planes inclining towards the southern side of the horizon in an angle either greater or less than the equinoctial plane.

*To draw an inclined DIAL.* The inclination of the plane, as DC, ( $n^{\circ} 11$ ) being found by a declinator, as taught under the article DECLINATOR, if it fall between the equinoctial plane CE, and the vertical one CB, so as that the angle of inclination DCA be greater than the elevation of the equator ECA, on the upper side draw a north dial, and on the lower a south dial to an elevation of the equator, which is equal to the aggregate of the elevation of the equator of the given place, and the complement of the inclination to a quadrant. If the inclined plane CF fall between the horizontal one CA, and the equinoctial one CE, so as that the angle of inclination FCA is less than the elevation of the equator ECA, describe an horizontal dial to an elevation of the pole equal to the aggregate of the elevation of the pole of the given place, and the inclination of the plane. See the article *Horizontal-DIAL*

Inclined

Inclined dials are drawn after the same manner as primary dials, except that the index in the former case must be fitted under the angle ADC, and in the latter, under the angle DFC, and that the distance of the center of the dial from the line of contingency is in the former case DC, and in the latter FC.

*Reclining DIALS*, those delineated on planes reclining backwards from the zenith towards the north, in an angle greater or less than the polar plane.

*To describe a reclining DIAL.* If the reclined plane HC, ( $n^{\circ} 11.$ ) fall between the vertical plane BC, and the polar plane IC, so as that the angle of reclination BCH is less than the distance of the pole from the zenith BCI, describe two vertical south and north dials to an elevation of the equator equal to the difference between the elevation of the equator of the given place, and the angle of reclination. See *vertical, south and north DIAL.*

If the reclined plane, as KC, fall between the polar plane IC, and the horizontal one CL, so as that the angle of reclination BCK is greater than the distance of the pole from the zenith ICB, describe an horizontal dial thereon to an elevation of the pole equal to the difference between the angle of reclination, and the elevation of the equator of the given place. See *Horizontal DIAL.*

*De-inclined DIALS* are those which both decline and incline, or recline. The use of these being very rare, we shall not trouble the reader with a description of them.

*Construction of an universal inclined, horizontal and equinoctial DIAL.* This instrument consists of two plates of brass, or other solid matter, whereof the under one A ( $n^{\circ} 12.$ ) is hollowed about the middle, to receive a compass fastened underneath with screws. The plate B is moveable by means of a strong joint at C. Upon this plate is drawn a horizontal dial for some latitude greater than any of those the dial is to be used in, with a style E proportionable to that latitude. For when the plane B is raised by means of the quadrant D, the horizontal plane must always have a less latitude than that the dial is made for, otherwise the axis of the style will have an elevation too little. Instead of the quadrant D is generally placed an arch from the equator to  $60^{\circ}$  numbered down-

wards,  $60$  being at the bottom, and for this latitude of  $60^{\circ}$ , the horizontal dial is commonly drawn. The arch of  $60^{\circ}$  is fastened by two small tenons, and may be laid down upon the plate A, as likewise may the style upon the plate B, and both of these are kept upright by means of little springs underneath the plates.

*The use of the inclined horizontal DIAL.* Raise the upper plate B to the degree of latitude of the place where you are, by means of the gradations on the quadrant D. Then if the plane A be set horizontal, so that the needle of the compass settles over its line of declination, the shadow of the axis will shew the hour of the day.

*Use of the equinoctial DIAL.* You must place the edge of the equinoctial circle HBI to the degree of the elevation of the pole by means of the quadrant, and if the dial be set north and south by means of the compass, the shadow of the style will shew the hour of the day at all times of the year, even when the sun is in the equinoctial, because the circle is hollowed.

*Ring-DIAL*, a kind of dial, consisting of a brass ring, seldom exceeding two inches in diameter, and one third of an inch in breadth. In a point of this ring there is a hole, through which the sun beams being received, make a lucid speck on the concavity of the opposite semicircle, which gives the hour of the day in the division mark'd therein. But it only holds good about the times of the equinox, unless the hole is made moveable, and the days of the month are marked on the convex side of the ring. In this case the dial can be rectified for any time, and will shew the hour of the day throughout the year.

To use it, put the moveable hole to the day of the month, then suspending it by the little ring, turn it towards the sun till his rays point out the hour among the the divisions on the inside.

*Universal or astronomical ring-DIAL*, a dial serving to shew the hour of the day in any part of the earth; whereas the former is confined to a certain latitude. It is composed of two rings, or flat circles, from two to six inches in diameter, and their breadth proportional. The outward ring HREP (plate LXXI. fig. 13.) represents the meridian of the place of the observer, and contains two divisions of



of 90° each, as HR and EP diametrically opposite to each other, the one serving from the equator to the north pole, and the other from the equator to the south. The inner ring BC represents the equator, and turns exactly within the outward ring, by means of two pivots at the points of the hours of 12. A cursor N composed of two little pieces, slides along an aperture, in the middle of the bridge I. which cursor has a small hole to admit the rays of the sun. The middle of this bridge represents the axis of the world, and its two extremities the two poles; on one side of it are drawn the signs of the zodiac, and on the other, the days of the month. On the edge of the meridian slides a piece *ba*, with a ring I. fitted to it, by which the instrument is to be suspended during the observation. This ring represents the zenith.

*Use of the universal ring-DIAL.* Place the line on the middle of the sliding piece, immediately below the ring, to the latitude of the place, and fix the line crossing the hole of the cursor to the day of the month, or degree of the sign in which the sun then is. Open the instrument so, that the two rings be at right angles to each other, and suspend it by the ring I: turn the flat side of the bridge towards the sun, so that his rays coming through the little hole in the middle of the cursor fall exactly on a line drawn round the middle of the concave surface of the interior ring, where it will point out the hour. Let it be observed, however, that this dial will not shew the hour of 12, because the outer circle being then in the plane of the meridian, hinders the sun's rays from falling on the inner. Neither will it shew the hour when the sun is, in the equinoctial, for then his rays fall parallel to the plane of the inner circle.

*Quadrantal DIAL.* See the article HORODICTIC QUADRANT.

*Reflecting DIAL,* a sort of dial shewing the hour of the day by means of a thin piece of looking-glass plate, so placed, as to reflect the sun's rays on the top of a ceiling, where the hour-lines are drawn.

*Nocturnal DIAL,* that which shews the hours of the night, of which there are two kinds, lunar and sidereal.

*Lunar, or moon-DIAL,* shews the hour of the night by means of the shadow of the moon, projected from an index.

*To describe a horizontal moon-DIAL.* Draw first a horizontal sun-dial. 2. Erect two lines AB, CD. (plate LXXII. fig. 1.) perpendicular to the line of 12 o'clock; and dividing the interval GF into twelve equal parts, draw lines parallel through the several points of division. 3. If the first line CD be appropriated to the day of the new moon, and the second line to the day when the moon comes later to the meridian than the sun by one hour, and so the last line AB correspond with the day of full-moon, the intersections of these lines with the hour-lines will give points, through which to draw a curve line, 12, 12, for the meridian line of the moon. 4. In the same manner determine the other hour lines 1, 1; 2, 2; 3, 3, &c. which the shadow of the moon projected from the style of the dial, intersects at the respective hours. 5. Blot out the hour lines of the sun-dial, together with the perpendiculars, by means of which the lunar hours were drawn, and divide the interval GF by other parallel lines into fifteen equal parts, because there are nearly fifteen days between new moon and full moon. Lastly, to these lines write the several days of the moon's age. Now the moon's age being learnt from the calendar, the intersection of the line of the moon's age, with the lunar horary lines, will give the hour of the night.

We may likewise find the hour of the night by a sun-dial. Thus, observe the hour which the shadow of the index points at by moon-light: find the moon's age in the calendar; multiply the number of days by  $\frac{2}{3}$  and the product is the number of hours to be added to the hour shewn by the shadow, to give the hour required. But if this number exceed 12, then twelve hours are to be subtracted, and the remainder will be the hour required.

*DIALS without centers,* those whose hour-lines converge so slowly, that the center they converge towards cannot be expressed on the given plane. Horizontal dials of this kind are to be made for places, the elevation of whose pole is either very great or very small; and vertical dials without centres are for places, which have the pole very much elevated.

*Furniture of DIALS.* See FURNITURE. *DIALECT,* *διαλέκτος*, an appellation given to the language of a province, in

so far as it differs from that of the whole kingdom. The term, however, is more particularly used in speaking of the antient greek, whereof there were four dialects, the attic; ionic, æolic, and doric, each of which was a perfect language in its kind, that took place in certain countries, and had peculiar beauties.

In Great Britain, besides the grand diversity of english and scotch, almost every county has a dialect of its own, all differing considerably in pronunciation, accent, and tone, although one and the same language.

The way of the Gileadites proving the Ephraimites, by the pronunciation of *schibboleth*, or *fibboleth*, with *schin*, or *sa-mech*, is well known. So the Flemings are said to prove whether a man be a native of France, or not, by bidding him pronounce *ach ten tachtentick*, which they pronounce *act en tahtentick*, as being unable to articulate the aspirate *ch*.

**DIALECTICS**, *dialektica*, in the literary history of the antients, that branch of logics which taught the rules and modes of reasoning. See the article LOGICS.

**DIALIA**, and **FLAMEN DIALIS**, in roman antiquity. See **FLAMEN**.

**DIALLING**, the art of constructing all manner of dials. See **DIAL**.

Having described the most useful dials under the word **DIAL**, we now proceed to explain the philosophic principles of the art of dialling. In order to this, therefore, we are to consider, that as the time which passes between any meridian's leaving the sun, and returning to it again, is divided into 24 hours, so if we conceive a sphere to be constructed with 24 of these meridians, the sun will orderly come upon one of them at the beginning of every hour. Such a sphere may be represented by the figure PDSB (plate LXXII. fig. 2. n° 1.) where the several meridians are represented by P1S, P2S, P3S, and so on to 24 in all: since these meridians divide the equinoctial into 24 equal parts, each part will contain just 15°, because  $15 \times 24 = 360$ , the whole circle; and since all the meridians pass through the poles of the world, the planes of those meridians all intersect each other in one common line PS, which is the axis of the sphere, therefore the said axis PS is in the plane of each of the 12 meridians. Suppose Z to be the zenith of any place, and DWBE the plane of the horizon fixed within the sphere, constructed with the 12 meridians, 1, 1; 2, 2; 3, 3; 4, 4;

&c. then will the axis of the sphere-PS pass through the center of the plane at N; so that one half NP will be above the plane, and the other half NS below it. Suppose now this dialling sphere to be suspended by the point Z, and moved about so as to have the points D and B exactly in the south and north points of the horizon, and E and W in the east and west points, then will the sphere have a situation every way similar to that of the earth and heavens with respect to the given place, and the axis of the sphere to that of the earth. The sun, therefore, shining on such a sphere, will be attended with all the same incidents, and produce all the same effects as would happen if the said sphere were at the center of the earth, or the center N of the sphere coincided with the center of the earth, because the distance between the surface and center of the earth is insensible at the distance of the sun. Now it is evident, as the sun revolves about such a sphere, it will every hour be upon one half or other of the 12 hour circles, viz. from midnight to noon, it will be on those parts of the circles which are in the eastern hemisphere; and from noon to midnight, it will pass over all those in the western. It is also farther evident, that while the sun is in the eastern hemisphere, it will be first below and then above the plane of the horizon, and *vice versa* on the other side. Again, when the sun is upon any of these hour circles, by shining upon the axis it causes it to cast a shadow on the contrary side, on the plane of the horizon, on the lower or upper surface, as it is below or above the said plane. This shadow of the axis will be precisely in the line in which the plane of the hour-circle would intersect the plane of the horizon: if, therefore, lines were drawn through the center N, joining the points on each side the plane where the hour-circles touch it, as 4N4, 5N5, 6N6, &c. the shadow of the axis will fall on those lines at the beginning of each respective hour, and thereby indicate the hour-circle the sun is in for every hour of the day. These lines are properly called hour-lines, and among the rest that which represents the hour of 12 at noon is NB, half the meridian line DB; whence it appears that the hour-lines N1, N2, N3, &c. which serve for the afternoon, lie on the east side of the plane, and are numbered from the north to the east; and on the contrary.

It

Fig. 1. MOON-DIAL.

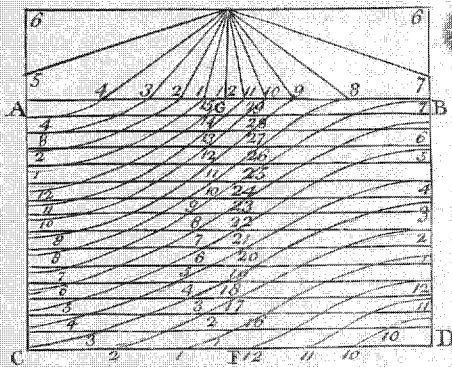


Fig. 2. DIALLING N<sup>o</sup> 1.

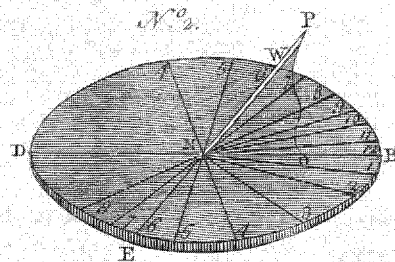
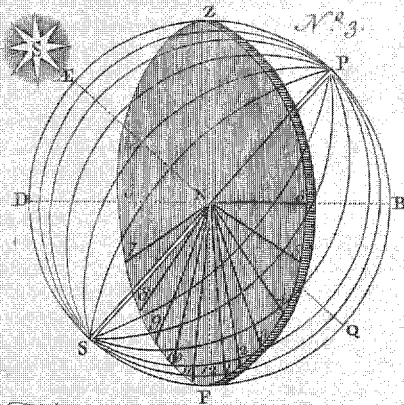
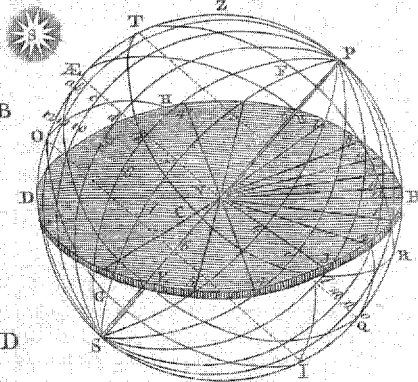


Fig. 4. DIANTHUS the PINK.

Fig. 3. DIAMETER.

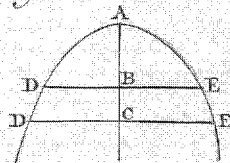


Fig. 5. DICTAMNUS.



Fig. 6. DIGITALIS FOX-GLOVE.



*D. purpurea* sculp.



It also appears, that as the sun's altitude above the plane is greater or less, the number of hour-circles the sun will possess above the horizontal plane will be also greater or less. Thus when the sun is at S in the equinoctial, its diurnal path for that day being the equinoctial circle itself  $\text{ÆEQW}$ , it is plain, since the arch  $\text{ÆE} = \text{EQ}$ , the sun will apply to six hour-circles below the horizon, and to six above it, in each half of the day; and consequently that on this day the shadow will occupy but 12 of the hour-lines on each surface of the plane, beginning and ending at six. But when the sun is in the tropic of cancer, its diurnal path for that day being the tropic itself,  $\text{TCRF}$ , it is manifest the sun in the forenoon ascends above the plane in passing between the hour-circles of 3 and 4 in the morning, and descends below it in the afternoon between the hours of 8 and 9: therefore on the summer tropic the shadow will pass over 16 of those hour-lines. On the contrary, when the sun is in the winter tropic at O, its path being then  $\text{OGIH}$ , it rises above the plane between 8 and 9, and leaves it between 3 and 4.

From what has been said, it is evident that if the circles be supposed removed, and only the horizontal plane remain, with the half of the axis NP (*ibid.* n° 2.) above it in the same position as before, then should we have constituted a horizontal dial, every way the same with those in common use, with only the addition of a substyle PO, to render the style NP very firm. Hence appears the reason why the gnomon or style NP, in those dials in our latitude, is always directed to the north pole, and always contains such an angle PNO, with the hour of 12 line, NB, as is equal to the latitude of the place. Lastly, the reason appears why the number of hour-lines on these dials exceeds not 16, and are all drawn from 6 to 12 and 6 again, on the northern part, the rest on the southern; and why the hour-line of 6 lies directly east and west, as that of 12 does north and south. If a plane be fixed within the same sphere in a vertical position, or perpendicular to the horizon, and coinciding with the plane of the prime vertical, that is, facing full south and north; then will the axis PS (*ibid.* n° 3.) still pass through the center of the plane N; and the lower semi-axis NS will by its shadow mark out the

hour-lines on the southern surface, and the upper semi-axis NP will do the same on the northern. These hour-lines are determined in the same manner as those on the horizontal dial; and it is plain the sun cannot come on the southern face of this plane before six in the morning, nor shine on it after six in the evening. It is also evident, that all the hours before 6 in the morning, and after 6 at night, will be shewn on the northern face or side of this plane, for the time of the sun's being above the horizon in any place. Hence the reason of a direct south and north vertical dial easily appears, both which are represented in fig. 3. n° 4 and 5 of plate LXX.

The gnomon NS (pl. LXXII, fig. 2. n° 3.) contains an angle  $\text{SNF} = \text{ZNP}$  with the meridian or hour-line of 12, viz. ZF, which is exactly the complement of PNB to 90°; hence the elevation of the gnomon in vertical dials is equal to the complement of the latitude of the place. The principles of a direct south dial being understood, it will be easy to understand those of a dial which does not face the south or north directly, but declines therefrom any number of degrees from east to west. But we refer the reader, who requires more ample instruction on this head, to the authors who have treated professedly of dialling; the most remarkable of these, besides Wolfius, to whom we are indebted for a great part of the article DIAL, are Clavius; Comandine, De Horologiorum descriptione; Joann. Bapt. Benedictus, De Gnomonum Usumque solarium usu; Geo. Schomburg, Exegetis fundamentorum Gnomonicorum; Solomon de Caus, Traite des Horologes solaires; Desargues, Maniere universelle pour poser l'effieu, & placer les heures, & autres choses, aux cadrans solaires; Kircher's Ars magna Lucis & Umbræ; Leybourn's Art of Dialling; Ozanam's Dialling; and M. De la Hire's Gnomonique, ou l'art de tracer les cadrans, avec les demonstrations.

DIALING-GLOBE, an instrument of brass or wood, with a plane fitted to the horizon, and an index, so contrived as to give a clear illustration of the principles on which dials are made. See the preceding article.

DIALING-LINES, or SCALES, are graduated lines placed on rulers, or the edges of quadrants and other instruments, to expedite the construction of dials. These

arc, 1. A scale of six hours, which is only a double tangent, or two lines of tangents each of  $45^\circ$ , set together in the middle, and equal to the whole line of fines, with the declination set against the meridian altitudes in the latitude of the place. 2. A line of latitudes, which is fitted to the hour-scale, and is made by this canon. As the radius : to the chord of  $90^\circ$  :: so are the tangents of each respective degree of the line of latitudes : to the tangents of other arcs. And then the natural fines of these arches are the numbers, which taken from a diagonal scale of equal parts, shall graduate the divisions of the line of latitudes to any radius. The lines of hours and latitudes are general, for pricking down all dials with centers.

The other scales are particular, and give the several requisites for all upright declining dials by inspection. They are, 1. A line of chords. 2. A line for the style's distance from the meridian. 3. A line for the style's height. 4. A line of the angle of 12 and 6. 5. A line of inclination of meridians.

**DIALLING-SPHERE**, an instrument made of brass, with several semi-circles sliding over each other upon a moveable horizon ; serving to demonstrate the nature of spherical triangles, as well as to give the true idea of drawing dials on all sorts of planes. See the article **DIALLING**.

**DIALLING**, among miners, the same with plumbing. See **PLUMBING**.

**DIALOGISM**, *διαλογισμός*, in rhetoric, is used for the soliloquy of persons deliberating with themselves, as the following of Juno, in the first *Æneid* of Virgil :

*mene incepto desistere victam ?  
Nec posse Italia Teucrorum avertere regem ?*

*Quippe vector satis ? &c.*

In this sense, it is distinguished from dialogue. See the article **DIALOGUE**.

**DIALOGISM** is also, in a more extensive sense, taken for discourse in general, whether held by a person alone, or in company.

**DIALOGUE**, in matters of literature, a conversation between two or more persons, either by writing or by word of mouth.

Dialogue appears to be the most ancient form of writing, and is greatly recommended by several authors. The archbishop of Cambray, at the head of his pastoral instruction, gives an account

of the advantages of dialogue. The Holy Spirit has thought proper to teach us in dialogue, *viz.* patience, in the book of Job ; and love of God, in the Canticles. The Dies Caniculares of Simon Maiolus, concerning various subjects of nature, is by the way of dialogue. That learned philosopher Claud Beringardus, a man of most profound judgment and ingenuity, wrote his *Circulus Pisanus*, wherein he lays open the most impenetrable secrets of all natural philosophy, by way of dialogue between Charilæus, as defender of the peripatetics, and Aristæus, as maintaining the principles of Anaximander. Also Joh. Bodinus, in his *Physics*, as well as in all the rest of his writings, treats, in his *Theatrum universæ naturæ*, of the various subjects of nature, in the form of a dialogue : and indeed under this appearance, and in this method of style, he has better opportunities, by way of objections, to introduce his own paradoxes, and the rest of his monstrous opinions. We have also several writers of travels, &c. in this way, both in the french and german languages ; and not a few medical and chemical authors, who have chose to instruct by way of dialogue.

Among religious writers, Justin Martyr opened this way in his controversy against the Jews. Minutius Felix followed it, in his against the idolaters. It is in this form that Origen judged he could best refute the error of Marcian. Many others might be mentioned who thought it no diminution to the majesty of the mysteries of faith, to maintain them by the familiarity of dialogue.

**DIALOGUE**, in music, a composition for at least two voices, or two instruments, which answer one another, and which frequently uniting at the close, make a trio with the thorough bass.

These are very much used by the Italians in their operas, oratorios, serenatas, &c.

**DIALTHÆA**, in pharmacy, an unguent much used as a resolvent, so called from althæa, or marsh-mallows, which is the principal ingredient in it. See the article **ALTHÆA**.

This ointment consists also of linseed and fenugreek seed ; the other ingredients are common oil, wax, resin, and turpentine. It is applied by rubbing it on the part affected.

**DIALYSIS**, in grammar, a mark or character, consisting of two points, *..*, placed over

over two vowels of a word, in order to separate them, because otherwise] they would make a diphthong, as mosaic, &c. See the article DIÆRESIS.

**DIAMARGARITON**, in pharmacy, the name of an antidote in Myrepsus, § i. cap. 37. in which pearls are a principal ingredient.

There are two kinds of the diamargariton, the hot and the cold, but neither of them are at present used.

The hot diamargariton, is a powder composed of pearls, pellitory, ginger, cinnamon, and several other hot ingredients.

Cold diamargariton is a solid electuary, composed of pearls ground fine, and white sugar dissolved in rose-water, or that of bugloss, and boiled to a consistence.

Compound cold diamargariton is a powder made of pearls, red roses, flowers of nenuphar and violet, lignum aloes, red and citron santal, tormentil root, &c.

**DIAMASTIGOSIS**, *διαμαστισις*, in grecian antiquity, a solemnity at Sparta, in honour of Diana Orthia, wherein the children of the most distinguished families were wont to slash and tear each others bodies with rods, before the altar of the goddess: the parents of the children being always present, used to animate and excite them not to give the least sign of pain or concern; and indeed so great was the bravery and resolution of the boys, that seldom or ever any cry or groan was heard to proceed from any of them, though they frequently whipped one another to death. The design of this custom was, no doubt, to fortify the children betimes, and harden them against wounds, bruises, &c.

**DIAMETER**, in geometry, a right line passing through the center of a circle, and terminated at each side by the circumference thereof. See the article CIRCLE.

The chief properties of the diameter are, that it divides the circumference of a circle into two equal parts: hence we have a method of describing a semicircle upon any line, assuming its middle point for the center. The diameter is the greatest of all chords.

For finding the ratio of the diameter to the circumference. See CIRCLE.

**DIAMETER of a curve** is a right line AC (plate LXXII, fig. 3.) bisecting the right lines DE, DE, drawn parallel to

one another; and are either of a finite or infinite lengths. Though a right line, bisecting all parallel lines drawn from one point of a curve to another, is taken in a strict sense only for the diameter of a curve line, yet it may not be amiss, more generally, to define a diameter in saying that it is that line, whether right or curve, which bisects all parallels drawn from one point of a curve to another, so that, according to this, every curve will have a diameter: and thence sir Isaac Newton's curves of the second order have all either a right-lined diameter, or else the curves of some one of the conic sections for diameters: and many geometrical curves of the higher orders may also have for diameter curves of more inferior ones, and that *ad infinitum*. See the article CURVE and CONIC SECTION.

**DIAMETER CONJUGATE**. See the article CONJUGATE DIAMETER.

**DIAMETER of a sphere** is the diameter of the semicircle, by whose rotation the sphere is generated; in which sense it is the same with axis. See the article AXIS.

**DIAMETER of gravity**, in any surface or solid, is that line in which the center of gravity is placed. See CENTER.

**DIAMETER**, in astronomy. The diameter of the planets are either apparent or real: the apparent diameters are such as they appear to the eye; and being measured by a micrometer, are found different in different circumstances and parts of their orbit. See the article PLANET.

The real diameters of the planets are such as they are in themselves, as expressed in the following table.

A Table of the real Diameters of the Sun and primary Planets in British Miles.

The diameter of	the Sun	763,460	} british miles.
	Mercury	4,240	
	Venus	7,906	
	the Earth	7,970	
	Mars	4,444	
	Jupiter	81,155	
	Saturn	67,870	

For the real diameters of the secondary planets, see MOON and SATELLITE.

The apparent diameters of the planets measured with a micrometer, are found different in different circumstances and parts of their orbits, as expressed in the following table.

## Apparent Diameters of the Planets.

		Least.	Mean.	Greatest.
According to De la Hire	{ Sun	31' 38" 0"	32' 1" 0"	32' 43" 0"
	{ Moon	29 30 0	31 30 0	33 30 0
	{ Saturn	0 14 10	0 16 2	0 19 40
	{ Jupiter	0 14 36	0 18 2	0 24 22
According to Hevelius	{ Mars	0 2 46	0 5 2	0 20 50
	{ Venus	0 9 30	0 16 46	1 5 58
	{ Mercury	0 4 4	0 6 3	0 11 48

The least apparent diameter of the planets, according to Huygens, are as follows: saturn 30", his ring 1' 8", Jupiter 1' 4", Mars 30", Venus 1' 25".

**DIAMETER** of a column, in architecture, is its thickness just above the base. See **COLUMN**. From this the module is taken, which measures all the other parts of a column. See the article **MODULE**.

**DIAMETER** of the diminution of columns, that taken from the top of the shaft. See the article **DIMINUTION**.

**DIAMETER** of the swelling, that taken at the height of one third from the base.

**DIAMOND**, *adamas*, in natural history, a genus of precious stones, of a fine pellucid substance, of great hardness, never fouled by any admixture of earthy or any other coarse matter, susceptible of elegant tinges from metalline particles, giving fire with steel, not fermenting with acid menstruums, scarcely calcinable by any degree of fire, and of one simple and permanent appearance in all lights.

This is the most valuable and hardest of all gems, and, though found of different shapes, and sometimes accidentally tinged to several colours; yet ever carries the same distinguishing characters, and is very evidently in all those states the same body. It is, when pure, perfectly clear and pellucid as the purest water, and is eminently distinguished from all other substances, by its vivid splendor, and the brightness of its reflections. It is extremely various in shape and size, being found in the greatest quantity very small, and the larger ones extremely seldom met with; the largest diamond certainly known ever to have been found is that in the possession of the Great Mogul, which weighs 279 carats, and is computed to be worth 779,244 l.

The diamond has certainly one proper and determinate figure, into which it naturally must concrete, when in a state of rest, and impeded by no other accident in its formation: the true figure then is an inequilateral octohedron; and wherever it has concentered in a perfect manner, and

without any interrupting accidents, it has always formed itself into this figure; and often in this its several surfaces are as bright as if polished by art: but, as in common salt, though its figure be pyramidal, yet very easy accidents can determine it into cubes and parallelopipeds; so the diamond has often, in the state of formation, been thrown into two other figures, both also seeming regular ones; the one a prismatic columnar one, of six angles somewhat emulating the figure of crystal, the other an oblong quadrilateral column with two truncated ends: these seem the only regular figures of this gem; but besides these it is every day found in numberless other mis-shapen forms, often roundish, emulating the shape of pebbles, but full of small flat planes or faces; frequently oblong, very often flat, and as often tapering, either from one end to the other, or else from the middle to both ends. A diamond bears the force of the strongest fire, except the concentrated solar rays, without hurt, and even that infinitely fiercest of all fires does it no injury, unless directed to its weaker parts.

It is a common thing for diamonds to be too thick or deep for the extent of their surface, and there is a certain proportion of depth, beyond which the gem should not be allowed: in this case two diamonds are often made, by the regularly dividing one: this, when the mass is of an angular figure, is done by cutting it through with a wire, wetted with oil, and covered with diamond-powder; but in the flat or more common masses, it is done much more expeditiously by finding the grain of the stone, and introducing the point of a fine flat chissel between them. This is not the only use of the splitting, for when a diamond has a flaw or blemish in it, which greatly debases its value, the plates may be separated at a proper breadth, and the flaw removed; in which case the thinner crust, struck off, is of value in proportion to its size, and the remainder, being now freed from its flaw,



is of much more value than it was at first. The places whence we have the diamonds are the East-Indies, in the island of Borneo, and in the kingdoms of Visapour, Golconda, Bengal; and the Brasils in the West-Indies. They are not unfrequently found yellowish, blueish, and reddish, but more rarely greenish.

There have not been wanting people who have attributed to the diamond great virtues as a cordial; but we are apt to believe no body ever did, or will, try whether this has been said with any sort of foundation.

**Valuation of DIAMONDS**, among jewellers, is thus calculated: they suppose the value of a rough diamond to be 2 l. per carat; then to find the value of those of greater weight, they multiply the square of their weight by 2, and this last product is the value of the diamonds in their rough state: thus, the value of a rough diamond weighing 4 carats, is equal  $4 \times 4 \times 2 = 16 \times 2 = 32$  l. and so in other cases. Again, to find the value of wrought diamonds, they suppose half their weight lost in the manufacturing them, and therefore multiply the square of double their weight by 2; thus the value of a wrought diamond, weighing 3 carats, is equal  $6 \times 6 \times 2 = 36 \times 2 = 72$  l.

**Cornish DIAMOND**, in natural history, a name given to a kind of crystals, from their being found in Cornwall. See the article CRYSTAL.

**Rough DIAMOND** is the stone as nature produces it in the mines.

**Rose-DIAMOND** is that quite flat underneath, with its upper part cut in divers little faces, usually triangles, the uppermost of which terminate in a point.

**Table-DIAMOND** is that which has a large square face at top, encompassed with four lesser.

**Brilliant DIAMOND** is that cut in faces both at top and bottom; and whose table, or principal face at top, is flat.

**DIAMOND**, in the glass-trade, an instrument used for squaring the large plates or pieces; and, among glaziers, for cutting their glass.

These sort of diamonds are differently fitted up; that used for large pieces, as looking-glasses, &c. is set in an iron ferril, about two inches long, and a quarter of an inch in diameter; the cavity of the ferril being filled up with lead, to keep the diamond firm: there is also a handle of box, or ebony, fitted to the ferril, for holding it by.

**DIAMOND**, in heraldry, a term use for expressing the black colour in the achievements of peerage.

Guillim does not approve of blazoning the coats of peers by precious stones instead of metals and colours; but the english practice allows it. Morgan says the diamond is the emblem of fortune.

**DIAMOND-CUTTER**. See LAPIDARY.

**DIAMORUM**, in pharmacy, a preparation of mulberries and honey, used against diseases of the throat, and for stopping dysenteries, &c.

**DIANÆ ARBOR**, or **ARBOR LUNÆ**, in chemistry, the beautiful crystallizations of silver, dissolved in aqua fortis, to which some quicksilver is added; and so called from their resembling the trunk, branches, leaves, &c. of a tree.

This elegant arrangement, however, of the particles of silver is not peculiar to this state or menstruum, since copper filings dropped into the solution of silver in aqua fortis, is found to have the same effect, when viewed by the microscope: nay, the silver-ores are frequently found ramified in the same manner.

**DIANDRIA**, in the linnæan system of botany, a class of plants comprehending all those with hermaphrodite flowers, and only two stamina in each; such are sage, olive, phillerea, jessamin, rosemary, &c.

**DIANO**, a town of the Genoese, about three miles from the sea. The country about produces great numbers of olives.

**DIANTHERA**, in botany, a genus of the *diandria-monogynia* class of plants, whose corolla consists of a single ringent petal; the tube is patulous, of the length of the limb: the upper lip is of an ovated figure, the lower lip is divided into three oblong and equal segments.

**DIANTHUS**, in botany, a genus of the *decandria-digynia* class of plants, whose corolla consists of five petals, the ungues of which are of the length of the cup; they are narrow, and inserted into the receptacle; the limb is plane; and the bractæ of the petals broadest at the extremity, and crenated; the fruit is a cylindric covered capsule, consisting of one cell, and opening four ways at the top; the seeds are numerous, compressed, and roundish. See plate LXXII. fig. 4. which represents the pink.

This genus comprehends the clove-juliy-flowers or carnations, the pinks, and sweet-williams; all beautiful flowers, which may be propagated by seeds or layers.

**DIAPASMA**,

**DIAPASMA**, in pharmacy, a name for all powders sprinkled on the body, whether as perfumes or otherwise. See the article **CATAPASMA**.

**DIAPASON**, in music, a musical interval, by which most authors, who have wrote upon the theory of music, use to express the octave of the Greeks. See **OCTAVE**. The diapason is the first and most perfect of the concords; if considered simply, it is but one harmonical interval; though, if considered diatonically, by tones and semitones, it contains seven degrees, *viz.* the three greater tones, two lesser tones, and two greater semitones.

The interval of a diapason, that is the proportion of its grave sounds to its acute is duplicate, *i. e.* as 2:1. See the articles **INTERVAL**.

**DIAPASON**, among the musical instrument makers, a kind of rule or scale, whereby they adjust the pipes of their organs, and cut the holes in their flutes, hautboys, &c. in due proportion, for performing the tones, semitones, and concords just.

A square being divided into eight parallelograms, the points wherein a diagonal line intersects all these parallelograms, express all the usual intervals in music: and on this principle it is that the diapason is founded. There is a particular kind of diapason for trumpets serving as a standard of the different magnitudes they must have to perform the four parts of music. See the article **TRUMPET**.

There is another for sackbuts, shewing how far they are to be lengthened and shortened, to raise or fall from one tone to another.

The bell-founders have likewise a diapason, serving to regulate the size, thickness, weight, &c. of their bells.

**DIAPASON DIAEX**, in music, a kind of compound concord, whereof there are two sorts; the greater, which is in the proportion of 10:3; and the lesser, in that of 16:5.

**DIAPASON DIAPENTE**, in music, a compound consonance in a triple ratio, as 3:9. This interval, says Martianus Capella, consists of nine tones and a semitone; nineteen semitones, and thirty-eight dieses. It is a symphony made when the voice proceeds from the first to the twelfth sound.

**DIAPASON DIATESSARON**, in music, a compound concord, founded on the proportion of 8:3. To this interval Martianus Capella allows eight tones and a semitone, seventeen semitones, and thirty-four dieses.

This is when the voice proceeds from its first to its eleventh sound. The moderns would rather call it the eleventh.

**DIAPASON DITONE**, in music, a compound concord, whose terms are as 10:4, or 5:2.

**DIAPASON SEMIDITONE**, in music, a compound concord, whose terms are in the proportion of 12:5.

**DIAPEDESIS**, in medicine, a transfusion of the fluids through the sides of the vessels that contain them, occasioned by the blood's becoming too much attenuated, or the pores becoming too patent.

**DIAPENSIA**, in botany, a genus of the *pentandria-monogynia* class of plants, the flower of which consists of one saucer-like petal, the tube being cylindrical, and the limb divided into five obtuse and plane segments; the fruit is a trilocular roundish capsule, containing a great many roundish seeds.

**DIAPENTE**, in the ancient music, an interval marking the second of the concords; and, with the diatessaron, an octave. See the article **DIATESSARON**. This is what in the modern music is called a fifth. See the article **FIFTH**.

The diapente is a simple concord; yet, if considered diatonically, it contains four terms; two greater tones, a less tone, and a greater semitone. The diapente is the greatest part of the octave harmonically divided. It is produced when the voice passes from its first to its fifth sound.

**DIAPENTE COL DITANO**, in music, is, by Zarlino, and many others, used for what we call the seventh major. See the article **SEVENTH**.

**DIAPENTE COL SEMIDITANO**, in music, is the seventh minor. See the articles **MINOR** and **MAJOR**.

**DIAPENTE**, in pharmacy, is used for a medicine compounded of five several drugs or ingredients.

**DIAPERED**, or **DIAPRE'**, in heraldry, the dividing of a field in planes, like fretwork, and filling the same with variety of figures. This chiefly obtains on bordures, which are diapered or fretted over, and the frets charged with things proper for bordures. Baron renders it *variatus*, which is not sufficient to express the several things of which it is variated.

**DIAPHANOUS**, an appellation given to all transparent bodies, or such as transmit the rays of light; a quality which, according to the cartesianians, is owing to the rectitude or straightness of their pores; but,

but, according to Sir Isaac Newton, to the homogeneity of the substance of these bodies, and of the medium which occupies their pores.

**DIAPHOENICUM**, in pharmacy, a sort of medicine or electuary chiefly made of dates. It purges serosities, and excites the menses. It is also used in dropsies, lethargies, apoplexies, and palsies.

**DIAPHORESIS**, *διαφροσις*, in medicine, an elimination of the humours in any part of the body through the pores of the skin. See the article PERSPIRATION.

**DIAPHORETICS**, among physicians, all medicines which promote perspiration. See the article ALEXIPHARMIC.

**DIAPHRAGM**, in anatomy, a large, robust, muscular membrane or skin, placed transversely in the trunk, and dividing the thorax from the abdomen, whence the latin writers call it *septum transversum*.

Its situation is not exactly even, but somewhat oblique, so that the anterior part is higher, the posterior lower; its upper superficies convex, and its lower concave. It is connected with the sternum, the spurious ribs, the pericardium, the mediastinum, and the vertebrae of the loins. Its figure, taken transversely, is somewhat oblong and elliptic. There are in the diaphragm two large foramina; the first is in the left side of it, and gives passage to the gula, and the par vagum; the second is in the right side of it, and the lower trunk of the vena cava passes thro' it: there is also an interstice between the two heads of the lower part, through which pass the aorta, the vena azygos, and the ductus thoracicus. The diaphragm is covered with a membrane on the upper part from the pleura; on the lower, from the peritonæum. Its substance is muscular: the upper part, which is large and elliptic, arises from the spurious ribs, the transverse muscles of the abdomen, and the cartilago xiphoides; and, with its tendon, renders the nervous center of the diaphragm almost triangular: the lower arises from a double base, from the vertebrae of the loins on each side, and is inserted nearly into the center of the superior.

The uses of the diaphragm are, first, to assist in respiration; for, in taking in the breath, it is pressed downwards, and, in expiration, it rises upward into the cavity of the thorax: secondly, to assist the necessary motions of the contents of the abdomen, *viz.* of the stomach, intestines,

liver, and spleen; and in the promoting the secretions of the chyle, bile, &c. And, lastly, for assisting the expulsion of the feces, the urine, the foetus in parturition, and of the secundines.

**DIAPORESIS**, in rhetoric, a figure of oratory, expressing the uncertainty of the speaker how he shall proceed in his discourse: such is that beautiful line of Homer,

*Τι πρῶτον, τι δ' ἐπεῖτα, τι δ' ὕστατον καταλέξω;*

**DIAPRE**, **DIAPERED**, in heraldry. See the article DIAPERED.

**DIAPRUNUM**, in pharmacy, the name of two compositions directed thus in the London dispensatory.

The *diaprunum lenitivum*: Take of new and ripe damask prunes, one hundred; boil them in a sufficient quantity of water, till they are soft: then remove them from the fire, and when cold, drive the pulp through a sieve, and set by for use. In the liquor strained from the prunes, before pulping, boil one ounce of violet flowers, and after straining again, dissolve in it two pounds of sugar, and boil into a syrup; to which add of the before-mentioned pulp half a pound; of cassia and tamarinds, dissolved in a little of the same decoction and pulped, of each one ounce; boil them again over a gentle heat, and frequently stir the mixture; after which sift in the following powders, of coriander-seed, rhubarb, liquorice, and marsh-mallow roots, of each a sufficient quantity to make into a soft electuary.

The *diaprunum solutivum*: Take of the lenitive composition of prunes, four pounds; of prepared scammony, two ounces five drams, and mix them together into an electuary.

**DIARBEC**, or **DIARBECK**, the capital of a province of the same name, answering to the ancient Mesopotamia: it is situated on the river Tigris, near its source, in 42° east long. and 37° 30' north lat.

**DIARRHODON**, in pharmacy, a name given to divers compositions in which roses are the principal ingredient. In the old college dispensatory, one of these is directed *diarrhodon abbatis*; but it is omitted in the last. There are also the trochisci diarrhodon, composed of red roses, shavings of ivory, the saunders, liquorice, mastic, saffron, camphor, and rose-water: they are good to fortify the heart, stomach, and liver, and to stop dysenteries, and other fluxes of the belly.

Pilule diarrhodon are composed of aloes, 6 A trochisci

trochisci diarrhodon, worinwood leaves, mastic, and rock-salt. They are said to purge, fortify the stomach, promote digestion, and prevent a stinking breath. Neither are these too much used at present.

**DIARRHOEA, or LOOSENESS**, in medicine, is a frequent and copious evacuation of liquid excrement, by stool; and may proceed from aliments or humours of various kinds, derived from different parts into the intestines.

The cause is a stimulus, which irritates the viscera, occasioning the expulsion of their fluids; and may, therefore, proceed from the vessels of the liver, pancreas, mesentery, and intestines; whence, at the same time, the mouths of the mesenteric veins, and of the lacteals, are obstructed: or there may be an extraordinary laxity of the intestinal fibres: or, lastly, it may arise from a stoppage of other excretions.

It is frequently attended with gripings; the patient is weak, makes but little urine, has a depressed pulse, a depraved appetite, and is sometimes feverish. In a diarrhoea arising from sharp, fermenting juices in the primæ viæ, which accelerate the peristaltic motion of the intestines, the first indication is to discharge the stimulating matter, which may be perfected by a dose or two of rhubarb in the morning; at night the patient may take fifteen drops of the thebaic tincture, in two or three spoonfuls of simple cinnamon water: the rhubarb is to be repeated till the looseness abates, which is generally after the second dose.

If there is a saburra of ill-concocted matter in the stomach, a vomit will be necessary, of ipecacuanha, or two ounces of its tincture. If the diarrhoea continues to be violent, it will be proper to mix astringents with the rhubarb. If it proceeds from a suppressed perspiration, and if the stools are thin, and the patient feverish, first bleed, and then give emetics with a gentle purge. A bilious diarrhoea ought not to be too suddenly stopped, but the humours are to be corrected gradually: for which purpose, a scruple of rhubarb slightly toasted, with a few grains of nitre, is very useful. Likewise half a dram of the expressed oil of nutmeg, either alone, or mixed with a grain of opium, and given in broth, is very efficacious. The humours are likewise corrected with thin emulsions of almonds and white poppy seeds, with the addition of diacodium. When a diarrhoea is

very obstinate, after toasted rhubarb has been given for some days, a sweat should be promoted, with a dram of new venice treacle, and twelve grains of burnt hartshorn, calx of antimony and purified nitre. The patient's common drink may be decoct. alb. with solution of gum arabic; rice boiled in water, with a little cinnamon; or a decoction of the cort. granat. these may be made palatable with syrup of orange-peel. Clysters are likewise often serviceable.

An obstinate diarrhoea, according to Et-muller, is to be cured by a course of vomits of ipecacuanha. An habitual diarrhoea is greatly relieved by wearing a flannel shirt, and keeping the body warm, according to Wainwright.

The diarrhoea of children is not to be stopped, either with astringents, or narcotics: for the astringents turn the flux of sharp humours towards the noble parts, and endanger the life of the child. And though narcotics appease the severity of the turgescent humours for a time, yet they afterwards break out with greater force. Besides, opiates are too powerful for the tender constitution of infants, and must not be given at all, or with the utmost caution. In slight cases, diascordium may be ventured on, to five or six grains: but if there is a fever, it cannot be given without danger.

Therefore, the best way is to give chalk, coral, pearls, and the like, of which about half a scruple is a dose: after which the cure may be completed with rhubarb, from six grains to half a scruple in solution of syrup of roses.

In dangerous cases, a few grains of the eleuther bark may be added, or a dram of the extracts of peruvian bark may be dissolved in half an ounce of mint, or cinnamon water, and given from one to nine drops, every three or four hours. Externally the abdomen may be anointed with expressed oil of nutmegs, impregnated with carminative and stomachic oils. The nurse should shun the cold air, abstain from drinking too much, and use a temperate diet.

**DIARTHROSIS**, in anatomy, a kind of articulation, or juncture of the bones, in which there is a manifest motion. See the article **ARTICULATION**.

The diarthrosis comprehends, 1. The enarthrosis, in which the head of one of the bones is received into a deep cavity in the other, as in the articulation of the femur. 2. The arthrodia, in which the

head

head of one of the bones is received into a slighter cavity in the other, as in the juncture of the os humeri with the scapula. 3. The ginglymus, in which the bones mutually receive, and are received by one another, as is the case in the articulation of the humerus and cubitus. To these, Fallopius adds the trochoides, in which the motion is like that of a wheel about its axis, as is the case of the articulation of the first vertebra of the neck with the second: and to all these some of the modern anatomists have added also the amphiorthisis, a term which comprehends all those junctures of the bones which have a manifest motion, and which differ from the several articulations now described, either in regard of their figure, or the motion they allow of. See the articles ENARTHROSIS, ARTHRODIA, GINGLYMUS, &c.

**DIARY**, among traders, denotes a day-book containing the proceedings of one day. See the article **BOOK**.

**DIARY FEVER**, the same with an ephemera. See the article **EPHEMERA**.

**DIASCHISM**, διασχιζμα, among musicians, denotes the difference between the comma and enharmonic diesis, commonly called the lesser comma. See the articles **COMMA** and **DIESIS**.

**DIASCORDIUM**, in pharmacy, a celebrated composition so called from scordium, one of its ingredients. It is otherwise termed *confectio fraxastorii*, and is thus directed by the college.

Take of cinnamon and cassia-wood, of each half an ounce; of true scordium, one ounce; of cretan dittany, tormentil, bistort, galbanum, and gum-arabic, of each half an ounce; of storax, four drams and an half; of opium, and seeds of sorrel, of each one dram and an half; of gentian, half an ounce; of american bole, one ounce and an half; of lemnian sealed earth, half an ounce; of long pepper and ginger, of each two drams; of clarified honey, two pounds and a half; of sugar of roses, one pound; of generous canary, eight ounces; make into an electuary. See the article **ELECTUARY**. It is excellent in all kinds of fluxes, and a great strengthener both of the stomach and bowels. Nurses frequently give children this medicine to make them sleep; but the practice is very detrimental, and generally the cause of many disorders, as it keeps them too costly. It is also used against the plague, and to prevent putrefaction.

**DIASEBESTEN**, in pharmacy, a soft purgative electuary, whereof sebestens are the principal ingredients. The other ingredients are prunes, tamarinds, juices of iris, anguria and mercurialis, penidies, simple diaprunum, violet seeds, and diagyridium. It is good in remitting and continued fevers, &c.

**DIASENNA**, in pharmacy, the name of a medicine in which senna is the principal ingredient.

The other ingredients are sugar-candy, cinnamon, lapis lazuli, silk, cloves, galanga-minor, black pepper, nardus indica, seed of basilicum, flowers of cloves, cardamoms, saffron, ginger, zeolary, &c. This electuary is taken against melancholy and spleen, and against diseases arising from an atrabilis.

**DIASIA**, in grecian antiquity, a festival kept at Athens in honour of Jupiter the propitious.

**DIASIASIS**, a term used by antient physicians for a distention of the muscles, or separation of the bones.

**DIASTEM**, διαστημα, among antient musicians, the same with what the moderns call interval. See **INTERVAL**.

Musicians divide intervals into two kinds; one of them is called system, which is to contain, at least, two intervals in the diatonic kind of music; but in the enharmonic, it contains more: the other, which they call diastem, is a mere simple interval.

**DIASTOLE**, διαστολη, among physicians, signifies the dilatation of the heart, auricles, and arteries; and stands opposed to the systole, or contraction of the same parts. See **SYSTOLE** and **HEART**.

Many are the opinions of authors concerning the cause of the diastole of the heart; but the most probable one seems to be that of Dr. Drake, who attributes it to the operation of the air in the lungs; which, expanding the pulmonary arteries and veins, acts like the drawing of the embolus of a pump; and as this enlargement, which is very considerable, makes way for the blood to circulate, so the contraction of the heart acts like the pressure of the atmosphere upon the surface of water, compelling it to flow where the resistance is least. See **CIRCULATION**. Thus a passage is opened for the blood to pass from the right ventricle to the left, through the lungs; and at the same time, by emptying the right ventricle, facilitates the systole, whereby the blood is protruded from the left ventricle.

**DIASTOLE**, in grammar, a figure of prosody, whereby a syllable naturally short is made long : such is the first syllable of Priamides, in the following verse of Virgil.

*Atque hic Priamides : nihil è tibi, amice, relictum.*

This figure is used either out of mere poetic licence, without any necessity for so doing, or through necessity, for the sake of the verse ; as when three or more short syllables follow each other in hexameter verse.

**DIATYPE**, in the antient architecture, an edifice, where the columns stand at such a distance one from another, that eight modules, or four diameters, are allowed for the intercolumniation.

**DIASYRMUS**, *διασυρμος*, in rhetoric, a kind of hyperbole, being an exaggeration of some low, ridiculous thing.

**DIATESSARON**, *διατεσσαρον*, among antient musicians, a concord, or harmonical interval, composed of a greater tone, a less tone, and one greater semi-tone : its proportion in numbers is as 4 : 3. See the article CONCORD.

**DIATESSARON**, in pharmacy, the name of a composition so called, from the four ingredients it comprehends : it is prepared thus.

Take of gentian root, bay-berries, myrrh, and roots of birthwort, of each two ounces ; of honey, two pounds ; mix them into an electuary. This, with the addition of the shavings of ivory, two ounces, is entitled *diapente*, or a composition of five ingredients.

This medicine was at first entered in the college dispensatories under the name of *theriaca*. Quincy recommends it as a medicine of great importance in the diseases of cattle. It is also used against the sting of venomous beasts, epilepsies, convulsions, &c.

**DIATONIC**, an epithet given to music, as it proceeds by tones and semi-tones, both ascending and descending. See the article MUSIC and GENUS.

The greek authors divide the genera or kinds of music into diatonic, chromatic, and enharmonic. See CHROMATIC and ENHARMONIC.

Diatonic music, according to Nicomachus and others, allows of three degrees, the greater tone, less tone, and semi-tone. See the article TONE.

Hence diatonic music appears the most natural, and of consequence the most ancient. In the diatonic music, there is a

tone between every two notes in the scale, except *mi, fa*, and, as the French term it, *si* and *ut*, where there is only a greater semi-tone. The diatonic genus was by the antients divided into two species, the *molle*, and the *intensum*. The last is in daily practice. It is commonly said to consist of two tones and a semi-tone ; but to speak exactly, it consists of a semi-tone major, a tone minor, and a tone major.

**DIATONICO-DIATONICO**, according to Zarlino, is the pure and natural diatonic genus, or when the progress of the notes is B quarré or B natural, in which not one of the sounds is the least altered. Such is the plain chant of the church.

**DIATRAGACANTH**, in pharmacy, a name applied to certain powders, whereof gum tragacanth is the principal ingredient ; of which there are two kinds, the cold and the hot : the cold is directed thus : take of gum tragacanth, two ounces ; of gum arabic, an ounce and two drams ; of starch, half an ounce ; of liquorice, and the seeds of melons and white poppies, of each two drams ; of sugar-candy, three ounces ; mix them into a powder. This is frequently prescribed in hectic heats, in choleric constitutions, in distempers of the breast, in stranguries, heat of urine, and the pungency of venereal gleet.

Powder of hot diatrachanth is composed of gum tragacanth, cinnamon, hyssop, almonds, linseed, fenugreek, liquorice, and ginger. It is good against asthma, to promote expectoration, strengthen the stomach, and assist digestion.

**DIAUGOPHRAGMIA**, in natural history, a genus of fossils of the order of septariæ, whose partitions, or septa, consist of spar with an admixture of crystal. Of this genus there are three species. 1. A red kind, with brownish-yellow partitions. 2. A brownish-yellow kind, with whitish partitions. 3. A bluish-white kind, with straw-coloured partitions.

**DIAULODROMI**, *διαυλοδρομοι*, in antiquity, an appellation given to such racers as passing round the meta, or goal, returned to the carcer, or place of starting, before the race was finished.

**DIAZEUCTIC**, or **DIEZEUCTIC TONE**, in the antient greek music, a tone which disjoined two fourths, one of each side of it ; and which, being joined to either, made a fifth : this, in their music, was from *meze* to *parmeze* ; that is, from our A to B ; supposing *mi* to stand in B *fa* *mi*,

*2*; they allowed to their diezeugdic tone, which is our *la mi*, the proportion of 9 : 8, as being the unalterable difference of the diapente and the diatessaron. See the article **DIAPENTE**, &c.

**DIBBLE**, among gardeners, the name of the tool, or forked stick, wherewith they set plants.

**DICE**, among gamesters, certain cubical pieces of bone or ivory, marked with dots on each of their faces, from one to six, according to the number of faces.

Sharpers have several ways of falsifying dice. 1. By sticking a hog's bristle in them, so as to make them run high or low, as they please. 2. By drilling and loading them with quicksilver; which cheat is found out by holding them gently by two diagonal corners; for if false, the heavy sides will turn always down. 3. By filing and rounding them. But all these ways fall far short of the art of the dice-makers; some of whom are so dextrous this way, that your sharpening gamesters will give any money for them.

Dice formerly paid 5 s. every pair imported, with an additional duty of 4 s. 9  $\frac{1}{2}$  d. for every 20 s. value upon oath; but are now prohibited to be imported.

**DICHORÆUS**, in antient poetry, the same with a double choræus. See **CHORÆUS**.

**DICHOTOMY**, a term used by astronomers for that phasis, or appearance of the moon, wherein she is bisected, or shews just half her disk. In this situation the moon is said to be in a quadrature aspect, or to be in her quadrature.

**DICHOTOMY**, in botany, a term used to express that division of the branches which we see in the mistletoe, and in the greater part of the sea fucus's, in which each branch is divided into two.

**DICHOTOPHYLLUM**, in botany, a name used by Dillenius for the ceratophyllum of Linneus. See the article **CERATOPHYLLUM**.

**DICKER**, *dicra*, in old writers, denotes the quantity of ten hides of skins, whereof twenty made a last: also ten pair of gloves, ten bars of iron, and the like, are sometimes expressed by the term dicker.

**DICROTUS**, a name given by antient naturalists to a deer in its third year. See the article **DEER**.

**DICROTUS**, among antient physicians, a rebounding pulse, or one which beats double. See the article **PULSE**.

This is said to be an infallible sign of an approaching hæmorrhage; which may

be expected in twenty-four hours, if the dicrotus happens at every second or third pulsation; in two days, if at every eight; in three days, if at every sixteenth; and in four days, if only at every thirtieth, or thirty-second pulsation.

**DICTAMNUS**, **DITTANY**, in botany, a genus of the *decandria-monogynia* class of plants, the corolla of which consists of five ovato-lanceolated, acuminate, unguiculated, and unequal petals; three of which are turned upwards, and two are placed obliquely at the sides: the fruit is composed of five capsules, growing together by their insides; they are compressed, acuminate, distant at the top, and formed of two valves: the seeds are numerous, and turbinate. See plate **LXXII.** fig. 5.

The antients have recorded almost miracles of the virtues of this plant in the cure of wounds, and in the prevention of mischief from venomous bites: they tell us, that even the beasts were informed of its virtues on these occasions, and had recourse to it when hurt: they gave it also to promote the menses, and to assist delivery, in the expelling of the secundines, and in malignant fevers: with us it is wholly out of use, except as an ingredient in some of the officinal compositions.

The white dittany-root, which we call *fraxinella* in the shops, is accounted cardiac, uterine, and alexipharmic.

**DICTATE**, *dictamen*, among schoolmen, a motion, or suggestion of a man's conscience, contrary to which if any action is performed, it is properly termed a bad one, even if the consequences should prove otherwise. See **CONSCIENCE**.

**DICTATE**, *dictata*, is also used in the schools for the lecture of a master, which the scholars take down in writing: whence this act of the master is termed dictating.

**DICTATOR**, in the policy of the antient Romans, a magistrate invested with sovereign and even arbitrary power.

He had power of life and death; also to raise or disband troops, make war or peace, and that without the consent either of the senate or people, or being accountable for his proceedings. He was elected by one of the consuls in the night-time on the frontiers of the commonwealth, and no where else; and the ordinary duration of his office was only for six months, during which time all other magistracies ceased, the tribuneship excepted.

cepted. Whenever he appeared in public, he was attended by twenty-four licitors, or double the number allowed a consul. However, notwithstanding all this power, he could not go out of Italy, or even ride on horseback during a march, without leave from the people.

This office was accounted the safeguard of the commonwealth for four hundred years together, till Sylla and Cæsar, by assuming the title of perpetual dictators, converted it into tyranny, and rendered the very name odious.

**DICTION**, the phrase, elocution, or style of a writer, or speaker.

It is required that the diction, or language, of an orator, should be pure, proper to the subject, rich without affectation, strong and close without drineis, and suitable to the person, time, place, and audience. In tragedy, the diction is accounted the fourth essential part; and though it is of the least importance of any of the other essentials, yet special care must be taken that every passion speak in its peculiar diction. It is observed, that the diction of the Italians abounds too much with shrewd words, querks, and quibbles; and even the French are charged with the like fault in their diction. Some authors are, again, thought so preposterously fond of jocose and facetious repartees, and ludicrous sentences, that they have indulged this affectation to a fault; whence arose that sort of diction commonly called burlesque, of which the French have afforded us a specimen in the works of the celebrated Scarron.

**DICTIONARY**, a collection, or catalogue, of all the words of a language, art, science, &c. with their explanations, ranged in alphabetical order.

The most antient dictionaries for the latin tongue, are that called Papias, compiled by Solomon, abbot of St. Gall, and bishop of Constance, who lived about the year 1409; another compiled in 1496, called *Gemma Vocabulorum*; a third, called *Promptorium Parvulorum*, five Clericorum, printed in folio, at London, in the year 1499, by Richard Pynson: this work consisted only of one part, which exhibited the english words before the latin, being destitute both of the latin and historical parts: but these defects were supplied by a dictionary which was printed at London in quarto in the year 1616, by Wynkyn de Worde, entitled, *Ortus Vocabulorum alphabetico ordine*

*fere omnia quæ in Catholico, Brevisloquio, Cornucopia, Gemma Vocabulorum, atque medulla grammaticæ ponuntur, cum vernaculæ linguæ Anglicanæ expositione, continens.* The most celebrated old latin dictionary, is that of Ambrose Calepine, a hermit of St. Augustine, at Bergamo, and son of the count Calepin. The most noted old dictionaries in english and latin, are those of Cooper, Holyoake, and Gouldman: among the modern ones, Littleton, Cole, &c. but that of Ainsworth merits most consideration, as being agreeable to its title, *Thesaurus linguæ Latinæ compendarius*. The last editions of this book have been greatly improved by Samuel Patrick, L. L. D.

For the Greek, the most noted dictionaries are those of Stephens, Scapula, Schrievelius, Hedericus, &c. The most celebrated historical dictionary is that of Mr. Bayle, in two volumes folio, entitled, an historical and critical dictionary. The philosophical dictionary of greatest note, is that of Chauvinus; for commerce, that of Savary; for law, those of Calvinus and Jacob; and among the dictionaries of arts and sciences, may be reckoned those of Harris, Chambers, and Barrow.

In the French, the most worthy of notice among works of this nature, are the dictionary of Trevoux, and the *Encyclopedie*, of which last only three volumes in folio have yet appeared.

A performance of this kind being a digest of the body of learning, or, rather, of general knowledge, is thought capable of being made universally useful and instructive; and as the objects of our knowledge grow daily more numerous, and improvements in arts and sciences are continually made, a work of this kind is continually capable of new improvements. It is farther advanced, that, besides preventing, in some measure, the necessity and expence of a multitude of books, which too frequently retard rather than promote, and bewilder rather than guide in the pursuit of knowledge, there is no form or method of writing so advantageously disposed to propagate knowledge through the body of a people, or that can be made to comprehend so great a part of the circle of learning, and so well answer the purposes of a library, as a dictionary of this nature. The writers of a dictionary of arts and sciences, are exempted from the observation of certain laws concerning property; never pre-  
tending



tending to build upon their own foundation, or treat at their own expence, being privileged to raise contributions for the public service wherever they can. In effect, their quality as dictionaryists, or collectors, give them a title to every thing that may suit their purpose, without rendering them liable to the imputation of plagiarism. See more relating to the nature, character, and office of a dictionary, in the introduction.

**DICTUM**, in our old writers, signifies an arbitrament or award; and hence the term *dictores* is used for arbitrators.

**DICTUM DE KENELWORTH**, was an award between king Henry III. and his barons and others who had been in arms against him, wherein was contained a composition of those that had forfeited their estates in the rebellion. It was so called, on account of its being made at Kenelworth castle in Warwickshire.

**DIDACTIC**, or **DIDACTICAL**, in the schools, signifies the manner of speaking, or writing, adapted to teach or explain the nature of things.

**DIDAPPER**, in ornithology, the same with the *dob-chick*, a species of *colymbus*.

**DIDELPHIS**, in zoology, a genus of quadrupeds, of the order of the *glires*, the characters of which are these: there are two obtuse and four conical fore-teeth in the upper jaw; those of the lower jaw are eight, and very small; and the dog-teeth, in each jaw, are three in number. To this genus belong the opossum, and african rat, called by some *hayopolin*. See **OPOSSUM** and **HAYOPOLIN**.

**DIDYNAMIA**, *διδυναμία*, in the linnæan system of botany, a very comprehensive class of plants, the fourteenth in order; the essential characteristic of which is, that there are four subulated stamina, inserted into the tube of the flower, two whereof are shorter than the others, and placed together; the antheræ being commonly hid under the upper lip of the flower, and connivent in pairs. It has its name from the two longer stamina being supposed more efficacious in fecundating the seeds, than the rest; and as the genera belonging to it are very numerous, they have been divided into two series or orders, under the names of *gymnospermia* and *angiospermia*; the latter having, and the former wanting a pericarpium, or seed-vessel. See the article **BOTANY**.

To this genus belong *baum*, *germander*, *lavender*, *thyme*, *betony*, *mint*, *basil*, *fox-glove*, *bear's-breech*, &c.

**DIE**, in architecture, the same with *dye*. See the article **DYE**.

**DIE**, in geography, a town of France, in the province of Dauphiny, situated on the river Drome, twenty-two miles south of Grenoble: east long.  $5^{\circ} 20'$ , north lat.  $44^{\circ} 50'$ .

**DIEBEL**, in ornithology, a name given to the *chub*. See the article **CHUB**.

**DIEGEM**, a town of the austrian Netherlands, in the province of Brabant, about three miles north of Brussels: east long.  $4^{\circ} 20'$ , and north lat.  $51^{\circ}$ .

**DIEM CLAUSSET EXTREMUM**, a writ that formerly issued out of the chancery to the escheator of the county, upon the death of any of the king's tenants in capite, to inquire by a jury of what lands he died seised, of what value, and who was the next heir to him: and on the heir's coming of age, he was to sue livery of his land out of the king's hands.

**DIEPE**, a port-town of France, situated on the british channel, about thirty miles north of Rouen, and opposite to the port of Rye in England: east long.  $1^{\circ} 15'$ , and north lat.  $49^{\circ} 55'$ .

**DIEPHOLT**, a city of Westphalia, in Germany, situated at the north end of the Dummer-lake, thirty-five miles south of Bremen: east long.  $8^{\circ}$ , north lat.  $53^{\circ}$ . It is subject to the king of Great Britain, as elector of Hanover.

**DIER**, or **DYER**. See the article **DYER**.

**DIERVILLA**, in botany, a genus of the *pentandria-monogynia* class of plants; the flower of which is monopetalous, with an almost bilabiated limb, whereof the upper lip is again divided into two, and the under one into three segments: the fruit is an oval capsule surrounded by the cup, with only one cell, wherein are contained a great many very small oval seeds.

**DIES**, **DAY**, in chronology. See the article **DAY**.

**DIES**, in common law, are of two kinds, *dies juridici*, and *non juridici*.

**DIES JURIDICI**, or **FASTI**, are all days wherein justice is administered in court.

**DIES NON JURIDICI**, or **NEFASTI**, are all Sundays in the year, and, in easter term, the feast of ascension of our Lord; in trinity term, the nativity of St. John the baptist; in michaelmas term, the feast of all saints and all souls; and in hilyary term, the purification of the blessed virgin.

**DIES DATUS**, is a day, or time of respite, given by the court to the defendant in a cause.

**DIES MARCHIÆ**, was the day of congress, or meeting of the English and Scotch, annually appointed to be held on the marches, or borders, in order to adjust all differences between them.

**DIESIS**, in music, is the division of a tone less than a semi-tone; or, an interval consisting of a less or imperfect semi-tone.

Diesis is the smallest and softest change or inflexion of the voice imaginable: it is called a feint, expressed thus X, by a St. Andrew's cross, or saltier. Aristotle calls dieses the elements of the voice, as letters are those of discourse. It appears, however, that Aristotle's dieses were different from ours; and we find Vitruvius; and all the greek authors, expressly make the diesis a quarter of a tone: but the Pythagoreans, who are held inventors of the name diesis, did not make it so small: they only divided the tone into two unequal parts; and they called the lesser diesis, which we call a lesser semi-tone; and the greater, which we call the greater semi-tone, they called apotome. See the article **APOTOME**.

But in aftertimes, when the tone came to be divided into three or four parts, the name diesis was retained to them all.

The harmonical diesis is the difference between a greater and a less semi-tone. Dieses are divided into three kinds; the lesser enharmonical diesis, or simple diesis, marked by a single cross, which raises the note following two commas, or about a quarter of a tone, and is the least interval that is sung; and never more than two are found together in whatever genus; nor are those two of the same kind. The chromatic or double diesis, denoted by a double cross, raises the note following by a lesser semi-tone, or four commas, which is the common diesis. The greater enharmonical diesis, denoted by a triple cross, raises the following note six or seven commas, or about three quarters of a tone.

**DIEST**, a town of the austrian Netherlands, in the province of Brabant, situated on the river Demer, fifteen miles north-east of Louvain: east long.  $5^{\circ}$ , and north lat.  $51^{\circ} 5'$ .

**DIET**, *dieta*, *diæta*, in medicine, according to some, comprehends the whole regimen, or rule of life, with regard to the six non-naturals, air, meats and drinks, sleep and watching, motion and rest, passions of the mind, retentions and excretions. See the article **REGIMEN**, &c.

The more accurate writers, however, re-

strain the term diet to what regards eating and drinking, or solid aliments and drinks. See **FOOD** and **DRINK**.

The principal and most general aliment is bread, whereof the crust is esteemed most easy of digestion, the crum being more oily and heavy. Pulse of all kinds nourish much, but are heavy, windy, and viscous, and, consequently, are apt to cause obstructions. Rice, barley, and oats, properly prepared, are nourishing, emollient, and restorative. Nuts, almonds, and chefnuts are full of a nourishing oil, but are hard of digestion. Fruits, which are pulpy and tart, abound with water, and are refreshing, moistening, and sedative, appeasing the too rapid motions of the blood, quenching thirst, and digesting easily: such are strawberries, gooseberries, currants, apricots, peaches, pears, and apples. These should be eaten ripe, and in a small quantity at once; and the best way of all is to eat them boiled or baked, as being windy. Pot-herbs are less nourishing than the farinaceous or mealy substances. Lettuce, succory, sorrel, purslain, are cooling and refreshing; artichokes, cellery, cresses, asparagus, and parsley, are a little heating; and truffles, champignons, garlic, shallots, pepper, cloves, nutmegs, mustard, &c. heat very much.

Of animal substances used in diet, the flesh of young animals is preferred to that of old ones; and the flesh of wild animals is said to be lighter, and more easily digested, than that of tame.

Liquid aliments are milk, eggs, chocolate, soups, and broths. Milk is good for weak persons, whose stomach is languid; and for children new-laid eggs yield very good nourishment, are easy of digestion, and agree with old people, and those of an exhausted body. Chocolate is a very agreeable and nourishing liquor: it strengthens the stomach, restores the body, helps the digestion, and softens sharp humours; and consequently is very proper for persons of a weak stomach. See **EGGS**, **CHOCOLATE**, &c.

As to drinks, wine, taken too freely, is prejudicial; but, taken with moderation, it strengthens the stomach, and assists digestion. That malt liquor is accounted best, which is specifically lightest, and not saturated with too gross a substance, as passing more freely through the emunctories of the body, and especially by urine: for as to all thick, muddy, heavy, and stale beer, not sufficiently boiled, it  
offends.

offends the head, generates wind, obstructions, the strangury, asthma, and colic. See WINE, BEER, CYDER, OBSTRUCTION, STRANGURY, &c.

Tea promotes perspiration, strengthens and cleans the stomach, and helps digestion. Coffee, taken after dinner, helps digestion, and allays the fumes of wine. Moderately taken, it thins the blood and humours; but its excess agitates the blood, causes watching, and occasions hæmorrhages.

From this view of the materials of diet, it appears, that the best way to preserve health, is to live upon plain simple foods, lightly seasoned, and in a quantity agreeable to the age, strength of the stomach, sex, constitution, and chiefly to what nature has by experience been found to require. Hunger shews the best time of eating, as thirst does of drinking. Persons who find no inconvenience from dining and supping every day, need not change their manner of life; and, in youth, something taken between meals is not amiss. When a person is much fatigued, and his spirits dissipated, it is proper to rest before eating; and, in cases of distress and sorrow, the food should be very light, and small in quantity. In summer, when the spirits and fluid parts are apt to evaporate, the diet should be moist, cooling, and easy of digestion, to repair the loss with the greater speed; whereas, in winter, the stomach will admit of more solid and heating aliments. See the articles DIGESTION, FLESH, FRUIT, BUTTER, MILK, &c.

**DIET-DRINKS**, a form in physic, including all the medicated wines, ales, and wheys, used in chronic cases. They require a course or continuation to answer any intention of moment. In all acute cases they are of no use, but where the disorder of a constitution is gradually to be gained upon, much help may be had from this quarter.

**DIET**, or **DYET**, in matters of policy, is used for the general assembly of the states, or circles of the empire of Germany, and of Poland, to deliberate and concert measures proper to be taken for the good of the public.

The general diet of the empire is usually held at Ratisbon: it consists of the emperor, the nine electors, and the ecclesiastical princes; viz. the archbishops, bishops, abbots, and abbesses; the secular princes, who are dukes, marquesses, counts, viscounts, or barons; and the re-

presentatives of the imperial cities. It meets on the emperor's summons, and any of the princes may send their deputies thither in their stead. The diet makes laws, raises taxes, determines differences between the several princes and states, and can relieve the subjects from the oppressions of their sovereigns.

The diet of Poland, or the assembly of the states, consists of the senate and deputies, or representatives of every palatinate or county and city, and meet usually every two years, and oftener, upon extraordinary occasions, if summoned by the king, or, in his absence, by the archbishop of Gnesna. The general diet of Poland sits but six weeks, and often breaks up in a tumult much sooner: for one dissenting voice prevents their passing any laws, or coming to any resolutions on what is proposed to them from the throne. Switzerland has also a general diet, which is usually held every year at Baden, and represents the whole helvetic body: it seldom lasts longer than a month. Besides this general diet, there are diets of the protestant cantons, and diets of the catholic ones; the first assemble at Araw, and are convoked by the canton of Zurich; the second at Lucern, convoked by the canton of that name.

**DIETA**, a term used in old writers for a day's journey.

**DIETETIC**, denotes something belonging to diet, but particularly that part of physic which treats of this subject. See the article DIET.

**DIETS**, a town in the circle of the upper Rhine, in Germany, situated on the river Lohr, twenty miles north of Mentz, and subject to the house of Nassau-Orange: east long.  $7^{\circ} 46'$ , and north lat.  $50^{\circ} 28'$ .

**DIEU ET MON DROIT**, i. e. *God and my right*, the motto of the royal arms of England, first assumed by king Richard I. to intimate that he did not hold his empire in vassalage of any mortal.

It was afterwards taken up by Edward the third, and was continued without interruption to the time of the late king William, who used the motto *je maintiendrai*, though the former was still retained upon the great seal. After him queen Anne used the motto *semper eadem*, which had been before used by queen Elizabeth; but ever since queen Anne, *dieu et mon droit* continues to be the royal motto. See the article MOTTO.

**DIEU SON ACT**, words antiently often used in our law; and to this day, it is a

maxim in law, that the act of God shall prejudice no man : therefore, if a house is blown or beaten down by a tempest, thunder or lightning, the lessee, or tenant for life, or years, shall be quit of an action of waste ; and by the law he has likewise a special interest or liberty allowed to take timber, to rebuild the house for his habitation.

**DIEXAHEDRIA**, in natural history, a genus of pellucid and crystalliform spars, composed of two pyramids, joined base to base, without any intermediate column : the diexahedria are dodecahedral, or composed of two hexangular pyramids. See the article SPAR.

**DIFFAMATORY**, a term chiefly used in the phrase diffamatory libel, signifying a writing intended to scandalize or discredit a person, &c. See LIBEL.

By the roman law, and the antient ordonnances of France, the authors of diffamatory libels were punished with death.

**DIFFARRATION**, in roman antiquity, a ceremony whereby the divorce of the priests was solemnized, or the dissolving of marriage contracted by confarration. See the article CONFARRATION.

Vigeneré will have confarration and diffarration to be the same thing.

**DIFFERENCE**, in logic, signifies an essential attribute belonging to any species that is not found in the genus, and is the universal idea of that species : thus, body and spirit are two species of substance, which contain in their ideas something more than is in that of substance. In a body, we find impenetrability and extension ; in a spirit, a power of thinking and reasoning ; so that the difference of body is impenetrable extension, and the difference of a spirit is cogitation.

**DIFFERENCE**, in mathematics, is the remainder, when one number or quantity is subtracted from another.

It was a fundamental principle among the antient geometers, that the difference of any two unequal quantities, by which the greater exceeds the lesser, may be added to itself till it shall exceed any proposed finite quantity of the same kind. This principle seems inconsistent with the supposition of an infinitely small quantity, or difference, which added to itself by any number of times, is never to be supposed to become equal to any finite quantity whatsoever, which is the foundation of the modern method of infinitesimals : however, this last may, with proper caution, be made useful and accurate.

**DIFFERENCE of longitude**, of two places on the earth, is an arch of the equator, comprehended between the meridians of these two places.

**DIFFERENCE of ascension**. See the article ASCENSIONAL DIFFERENCE.

**DIFFERENCES**, in heraldry, certain additaments to coat armour, whereby something is added or altered to distinguish younger families from the elder.

Of these differences Sylvanus Morgan gives us nine ; *viz.* the label, for the first son ; the crescent, for the second ; the mullet, for the third ; the martlet, for the fourth ; the annulet, for the fifth ; the flower de lis, for the sixth ; the rose, for the seventh ; the eight-foil, for the eighth ; and the cross moline, for the ninth. See LABEL, CRESCENT, &c.

Again, as the first differences are single for the sons of the first house or descent, the sons of the younger house are differed by combining or putting the said differences upon each other. As the first differences are the label, crescent, &c. for the first house, the difference for the second house is the label on a crescent for the first of that house ; for the third brother of the second house, a mullet on a crescent, &c.

The original difference is controverted : Camden will have them to have begun about the time of king Richard : Paradin assigns differences worn as early as the year 870 ; wherein he contradicts the opinion of the president Fauchet, who says, arms were not hereditary in the french families, till after the time of Lewis the great, who came to the crown in the year 1110.

**DIFFERENTIAL CALCULUS**. See the article CALCULUS DIFFERENTIALIS.

**DIFFERENTIAL**, *differentialis*, in the doctrine of logarithms, a term used by Kepler for the logarithms of tangents, which we call artificial tangents. See the articles LOGARITHM and TANGENT.

**DIFFERENTIO-DIFFERENTIALIS CALCULUS**, is a method of differencing differential quantities.

We have observed, under the word calculus, that the differential of a quantity is expressed by the letter *d* prefixed to it, as the differential of *x* is called *dx* ; we are to remark, therefore, in this place, that the differential of *dx*, is *ddx* ; and the differential of *ddx*, is *dddxdx* ; or, as Sir Isaac Newton would express it, *x*, &c. These differentials may be expressed more compendiously thus, *d²x*, *d³x*, &c. whence

when we have powers or degrees of differentials. The differential of an ordinary quantity, is called a differential of the first degree, as  $dx$ . The differential of the second degree, is an infinitesimal of a differential quantity of the first degree, as  $ddx$ ,  $dxdx$ , or  $dx^2$ ,  $dx dy$ , &c. The differential of the third degree, is an infinitesimal of a differential quantity of the second degree, as  $ddd x$ ,  $dx^3$ ,  $dx dy dz$ , and so on.

The powers of differentials are differenced after the same manner as the powers of ordinary quantities: and as compound differentials either multiply or divide each other, or are perfect or imperfect powers of differentials of the first degree, the differentio-differentialis calculus is in effect the same with the differential calculus. See the article CALCULUS DIFFERENTIALIS.

For the use of the differentio-differentialis calculus, see Wolfii Elementa Analysis, par. 2. sect. iv.

**DIFFORM**, *difformis*, an appellation given to things whose appearance is irregular, in contradistinction to uniform. See the article UNIFORM.

It is much used in the description of plants of the *syngenesia* class, or those with compound flowers, when the partial flowers, or smaller floscules, happen to be of different kinds. See the article FLOWER.

**DIFFUSE**, an epithet applied to such writings as are wrote in a prolix manner. Among historians, Salust is reckoned sententious, and Livy diffuse. Thus also among the orators, Demosthenes is close and concise; Cicero, on the other hand, is diffuse.

**DIFFUSION**, the dispersion of the subtle effluvia of bodies into a kind of atmosphere all round them. Thus the light diffused by the rays of the sun, issues all round from that amazing body of fire; and thus are the magnetic particles diffused every where round about our earth, and parts adjacent to it.

The schoolmen make three kinds of diffusion. 1. That by which a pure quality is diffused, as light, force, &c. 2. That performed by the motion of bodies, as the diffusion of sound, smell, magnetic and electric bodies, &c. And, 3. That performed partly by the motion of corpuscles, and partly by the motion of a quality. Thus, say they, fire is diffused.

**DIGAMMA**, a name given to the letter F. See the article F.

**DIGAMY**, the same with bigamy. See the article BIGAMY.

**DIGASTRICUS**, in anatomy, a muscle of the lower jaw, called also biventer. See the article BIVENTER.

Mr. Monro assures us, that the digastric muscles not only pull down the lower jaw, but serve to draw up the os hyoides, and parts annexed to it, in deglutition. See the Medical Essays, vol. I. art. 2.

**DIGEST**, *digestum*, in matters of literature, a collection of the decisions of the roman lawyers properly digested, or arranged under distinct heads, by order of the emperor Justinian. It constitutes the first part or volume of the civil law.

**DIGESTER**, or **DIGESTOR**. See the article DIGESTOR.

**DIGESTION**, in medicine, is the dissolution of the aliments into such minute parts as are fit to enter the lacteal vessels, and circulate with the mass of blood.

Various are the systems and hypotheses framed by physicians and philosophers to account for digestion. Some contend that it is done by a kind of elixation of the solid and grosser parts of the food in the liquid by the heat of the stomach, and of the adjacent parts, the liver, spleen, &c. Others will have it done by attrition, as if the stomach, by those repeated motions, which are the effects of respiration, rubbed off the minuter particles from the grosser matters, and agitating the rest against each other, attenuated and dissolved them. See TRITURATION. Others think the bilious juice, others the spirits, chiefly concerned in digestion.

Others will have the food dissolved by a menstruum; but then they are greatly divided as to the nature and origin of this menstruum; some supposing it an acid furnished by the glands of the stomach; others, a nitro-aerial spirit, which by penetrating the mass of food, breaks the connection of the most solid parts; and others, a saline juice, which divides and volatilizes the parts of the food. Others, again, suppose digestion to be performed by means of a ferment or leaven, which mixing with the aliment, excites an intestine motion in the parts thereof, by which means the parts are attenuated and dissolved. But these likewise differ in their opinion of this ferment; some taking it to be the remains of the food last digested, which by its continuance in the stomach, has contracted an acid quality and become a ferment: others take the principles of fermentation to be contained in the ali-

ment itself, which when inclosed in the stomach, heated there, and put in motion, enters on its office of fermentation: others suppose the matter of the ferment supplied by the glands of the stomach; and lastly, others contend for the saliva, and make that the ferment serving principally for the digestion of the food. See the article FERMENTATION.

Some suppose digestion owing to gentle heat and motion. By this heat and motion, say they, the texture of the nourishment is changed in the bodies of animals; and then the constituent solid parts are indued with peculiar attractive powers of certain magnitudes, by which they draw, out of the fluids moving through them, like parts in certain quantities, and thereby preserve their forms, and just magnitudes. And, to mention no more, Boerhaave very justly, in our opinion, ascribes digestion to the joint action of several of the above-mentioned causes, aided by the expansion of the air contained in the aliments. See the articles CHYLE, CHYLIFICATION, BLOOD, &c. MASTICATION, NUTRITION, &c.

**Dysentery**, a disease attended with pain, and a sense of weight with cructations and copious flatulencies from corrupt humours in the stomach. See APEPSY.

It generally arises from a bad diet, particularly from eating too plentifully, especially fat and oily aliments, with a sedentary life and idleness. When the humours are corrupt, after a vomit, laxatives should be used: afterwards with a spare diet, stomachics and strengtheners, with exercise, and abstinence from studies. The use of spaw, or chalybeate waters is very efficacious for the cure of this disease. In almost all weaknesses of the stomach, chewing of rhubarb is convenient, especially in those that are costive.

**Digestion**, in chemistry, pharmacy, &c. the subjecting bodies, included in proper vessels, to the action of a gentle and continued heat.

The application of this operation, in regard to its end, is very various. In some cases, it is used with a view of producing a change in some one single body, as in the instance of the preparation called mercurius præcip. per se; in others, to promote solutions, or other combinations; but most frequently for extraction or separation, by means of fluids, of the required parts of some solid bodies, whose texture, impeding the quicker access and effect of menstrua,

renders a long infusion, and the relaxation of a gentle heat, necessary, in order to their being penetrated; or for accelerating the solution of bodies by menstrua, whose action when cold is not sufficiently vigorous.

The vessels generally used to contain the matter to be digested, are matrases, or bolt-heads, and sometimes glasses; but where the heat is so gentle as to make no evaporation, the structure is indifferent. In cases where an evaporation does happen, and the exhaling fluid is of any value, the vessels are to be constructed so as to confine the vapour, and return it in a condensed state. This is called circulation, and is commonly executed by inverting the neck of a smaller matras into that of a larger, in which case the conjoined glasses are called a pelican. There are several other kinds of pelicans of a more complex structure, but the flask used for Florence wine, divested of the straw-work, and inverted into a matras with a very long neck, will conveniently answer all the purposes. See CIRCULATION.

This operation is most generally performed in a sand-heat, and no greater adjustment of the degrees of heat is necessary for the purposes of pharmacy, than can be there effected; but formerly when the more mysterious and operose methods were followed, the heat of dunghills has been employed.

The degree of heat requisite in digestion, differs according to the nature of the subject: in tinctures, made with strong spirit of wine, or volatile salts, and in solutions where a great effervescence is apt to arise, a very gentle one should never be exceeded. In aqueous solutions, and most other cases, a greater may be allowed; but it must always be understood to be less than will make the matter boil, otherwise the operation comes not within the proper meaning of the word digestion, which is a distinction from coction.

The time which digestion ought to be continued, differs so greatly, according to the different application of the operation, that no other rule for it can be laid down, than that it should be continued till the intention to which it is made subservient be compleated.

In circulatory digestions, it is proper to lute the vessels, to prevent the escape of the vapours through the junctures, but in many cases this following precaution

caution is extremely necessary, *viz.* that a small aperture, or vent; be left, otherwise an incondensable vapour, which arises, will, if it cannot force the lute, inevitably burst the glasses. The instances in which this precaution is necessary, are all mixtures of acid spirits, with earths, metals, or alkaline salts; or of such salts of those substances which can be acted on by them. But in solution of salts in water, and in extracts of gums, or resins, made with volatile salts, wine, or spirits of wine, it may be safely omitted. The college of London have, in their dispensatory, as well according to the last edition as the former; used the word digestion in a sense different from the above definition, meaning by it only the suffering the ingredients of certain mixtures to be continued together without applying the use of heat, which they expressly order on each occasion to be applied or omitted, by saying, *digest with heat*, or *digest without heat*: this is confounding the sense of the word digest, with that of the word infuse. See the article INFUSION.

**DIGESTION**, among physicians, is used for maturation, or that state of a disease, when the morbid matter is so changed in bulk, figure, cohesion, mobility, &c. by the use of proper medicines, or even by the force of nature, as to be less noxious and hurtful, and consequently to abate the violence of the distemper. See the article DIGESTIVE.

**DIGESTION**, in surgery, is the disposing of an ulcer or wound to suppurate, or to discharge good pus, by the application of proper medicines. See the next article.

**DIGESTIVE**, in medicine, such remedies as strengthen and increase the tone of the stomach, and assist in the digestion of foods. See the article DIGESTION. To this class belong all stomachics and strengtheners, or corroborants.

**DIGESTIVE**, in surgery, such medicines as are applied to wounds, &c. in order to promote a good maturation and laudable suppuration of matter. Lenient, anodyne, and balsamic digestives, are to be applied to a gangrene. Digestives of turpentine, and the yolks of eggs, are useful in abscesses, wounds, and ulcers. See the article SUPPURATIVES.

**DIGESTOR**, in chemistry, a strong vessel made of copper, or iron, and fitted with a close cover and screws; so as to remain perfectly tight in a considerable degree of heat, whilst water, common air, and the

subject of the operation are contained therein. See the article DIGESTION.

The cover of the digester should always be provided with a valve to let out the steam, otherwise the vessel will certainly burst, whereby it may prove fatal to the by-standers.

Of all chemical vessels hitherto invented, the digester seems best calculated for increasing the action of menstrooms. Water, confined in a digester, is susceptible of so much heat, as to melt lead; and it is frequently found to melt the solder of lead and tin, wherewith the copper vessel was held together: here appears the necessity of using hard solder, made of spelter, or silver and brass, for this purpose; otherwise, the digester cannot contain the water, when much heated, without melting in the joints.

In this vessel, fresh ox-bone will be so digested in the space of a quarter of an hour, as to become soft and tender, and capable of being cut with a knife; and the water, in which it was boiled, turned into a hard jelly, and a large cake of fat on its surface, when all is properly cooled.

**DIGGING**, among miners, is appropriated to the operation of freeing any kind of ore from the bed or stratum in which it lies, where every stroke of their tools turns to account; in contradistinction to the openings made in search of such ore, which are called hatches or essay-hatches, and the operation itself, tracing of mines; or hatching. See the article TRACING OF MINES.

When a bed of ore is discovered, the beele-men, so called from the instrument they use, which is a kind of pick-ax, free the ore from the fossils around it, and the shovel-men throw it up from one shamble to another, till it reaches the mouth of the hatch. See the article BEELE, HATCH, &c.

In some mines, to save the expence as well as fatigue of the shovel-men, they raise the ore by means of a winder, and two buckets, one of which goes up as the other comes down.

**DIGGING A BADGER**, among hunters, is dislodging or raising him out of the earth.

**DIGIT**, **DIGITUS**, in astronomy, the twelfth part of the diameter of the sun or moon, is used to express the quantity of an eclipse. Thus an eclipse is said to be of six digits, when six of these parts are hid.

**DIGITS**, or **MONADES**, in arithmetic, signify any integer under 10, as 1. 2. 3. 4. 5. 6. 7. 8. 9.

**DIGIT** is also a measure taken from the breadth of the finger. It is properly  $\frac{3}{4}$  of an inch, and contains the measure of four barley corns laid breadth-wise.

**DIGITALIS**, **FOX-GLOVE**, in botany, a genus of the *didynamia angiospermia* class of plants, with a monopetalous and campanulated, or bell-fashioned flower, quadrifid at the edge : the fruit is an oval, acuminate, and bilocular capsule, containing a great number of small seeds. See plate LXXII. fig. 6.

The leaves and flowers of this plant, the only parts used in medicine, are reputed emetic and vulnerary.

**DIGITATED**, among botanists, an appellation given to compound leaves, each of which is composed of a number of simple foliola, placed regularly on a common petiole ; though, strictly speaking, there must be more than four foliola to make a digitated leaf. See plate LXXIII. fig. 7.

**DIGITUS**, **FINGER**, in anatomy. See the article **FINGER**.

**DIGITUS VENERIS**, in botany, a name used by some for the *nymphaea*, or water lily. See **NYMPHAEA**.

**DIGLYPH**, in architecture, a kind of imperfect triglyph, console, or the like, with two channels or engravings, either circular or angular. See the article **TRIGLYPH**.

**DIGNE**, a city and bishop's see of Provence, in France, fifty-five miles north of Toulon : east long. 6° 5', and north lat. 44° 6'.

**DIGNITARY**, in the canon law, a person who holds a dignity, that is, a benefice which gives him some pre-eminence over mere priests and canons : Such is a bishop, dean, arch-deacon, prebendary, &c. See the article **BISHOP**, **DEAN**, &c.

**DIGNITY**, as applied to the titles of noblemen, signifies honour and authority. As the omission of a name of dignity may be pleaded in abatement of a writ ; so may it be where a peer or nobleman, who has more than one name of dignity, is not named by that which is most noble.

**DIGNITY**, in the ecclesiastical sense, is defined by canonists, an administration joined with jurisdiction and some power. Simple prebendaries, therefore, without jurisdiction, are not dignities.

Dignities are sometimes simple, sometimes with cure of souls, and sometimes with jurisdiction and administration of sacred things. Camden reckons in England, including prebends, 544 ecclesiastical dignities. See the article **DIGNITARY**.

**DIHELIOS**, in astronomy, a name given by Kepler to that ordinate of the ellipses which passes through the focus, where the sun is supposed to be placed.

**DIJAMBUS**, in ancient poetry, a double iambus. See the article **IAMBUS**.

**DIJON**, the capital of the province of Burgundy, in France, situated on the river Ouche, 240 miles south east of Paris : east long. 5° 5', and north lat. 47° 15'.

**DIKE**, a ditch, or drain, made for the passage of waters. See **DITCH**, &c.

**DIKE** also signifies a work of stone, timber, earth, fascines, &c. raised to oppose the entrance of the waters of the sea, a river, lake, &c.

The most stupenduous works of this kind are the Dikes of Holland.

**DIKE-REEVE**, an officer who takes care of the dikes and drains in Lincolnshire.

**DILAPIDATION**, in law, a wasteful destroying or letting buildings, especially parsonage-houses, &c. run to decay, for want of necessary reparation. If the clergy neglect to repair the houses belonging to their benefices, the bishop may sequester the profits thereof for that purpose. And in these cases, a prosecution may be brought either in the spiritual court, or at common law, against the incumbent himself, or against his executor or administrator.

**DILATATION**, in physics, a motion of the parts of any body, by which it is so expanded as to occupy a greater space. This expansive motion depends upon the elastic power of the body, whence it appears that dilatation is different from rarefaction, this last being produced by the means of heat. See **RAREFACTION**. Gassendus and his followers affirm, that dilatation, by whatever cause it is produced, cannot happen without vacuities interpersed in the parts of the expanded body ; on the other hand, the Cartesianians teach that dilatation is performed by the intrusion or intromission of some subtile matter into the pores of the dilated body.

The moderns observe, that bodies, which being compressed, and afterwards left at liberty to restore themselves perfectly, endeavour



endeavour to dilate themselves with the same force, whereby they were compressed, and accordingly they sustain a force, and raise a weight equal to that by which they were compressed. They likewise remark, that bodies in dilating by their elastic power, exert a greater force at the beginning of their dilatation than towards the end, as being at first more compressed: and the greater the compression, the greater the elastic power and energy of dilatation. Wherefore these three, the compressing power, the compression, and the elastic power, are always equal. Again, the motion whereby compressed bodies restore themselves is for the most part accelerated. Thus an arrow shot from a bow does not quit the string till after it be perfectly restored to its natural state; nor does the arrow move swifter than the string: and if the string before it hath perfectly restored itself be stopped, the arrow will not go its full length; a proof that it is continually acquiring a new impetus from the string.

It may however happen, that where the compression is only partial, the motion of dilatation shall not be accelerated, but retarded, as appears in the compression of soft bread, sponge, gauze, &c.

**DILATATION** in surgery and anatomy, denotes the widening the orifice of a wound; or the distension of any vessel, or the like.

**DILATATOIRES**, in anatomy, a name given to several muscles in the human body; as, 1. *Dilatatores aë nasi*, a pair of muscles which serve to elevate the nose, and are very various in different subjects. In general, however, they are two on each side, though even in this they vary extremely, and sometimes are so thin and fine as scarce to be perceptible. They are also called the *pyramidalis* and *myrtiformis*. See the article **PYRAMIDALIS**, &c.

2. *Dilatatores urethræ*, of which the transversi arise from the tubercle of the os ischium on each side, and are inserted into the posterior part of the bulb of the urethra: they are not quite determinate and certain, however, either in their origin or insertion, and sometimes they are wholly wanting. When they act they dilate the urethra in its posterior part. The *dilatator posticus* arises from the anterior part of the sphincter of the anus, and is inserted into the posterior and lower part of the acceleratores; or

else into the lower part of the bulb of the urethra. Some have taken this muscle for a part of the sphincter ani. See the article **SPHINCTER**.

**DILE**, a name used by some botanists, for *isatis*, or woad. See **ISATIS**.

**DILEMMA**, in logic, an argument consisting of two or more propositions, which divides the whole into all its parts, or members, by a disjunctive proposition, and then infers something concerning each part, which is finally referred to concerning the whole.

Instances of this are frequent, as, "In this life we must either obey our vicious inclinations, or resist them: to obey them will bring sin and sorrow; to resist them is laborious and painful: therefore, we cannot be perfectly free from sorrow and pain in this life."

A dilemma becomes faulty, or ineffectual three ways. First when the members of the division are not well opposed, or not fully enumerated: for then the major is false. Secondly, when what is asserted concerning each part is not just, then the minor is not true. Thirdly, when it may be retorted with equal force upon him who utters it. There was a famous ancient instance of this case, wherein a dilemma was retorted. Euathlus promised Protagoras a reward when he had taught him the art of pleading: and it was to be paid the first day he gained any cause in court. After a considerable time, Protagoras goes to law with Euathlus for the reward, and uses this dilemma. "Either the cause will go on my side, or on yours: if the cause goes on my side, you must pay me according to the sentence of the judge: if the cause goes on your side, you must pay me according to your bargain. Therefore, whether the cause goes for me, or against me, you must pay the reward." But Euathlus retorted the dilemma thus. "Either I shall gain the cause, or lose it. If I gain the cause, then nothing will be due to you according to the sentence of the judge: but if I lose the cause, nothing will be due to you according to my bargain. Therefore, whether I lose or gain the cause, I will not pay you, for nothing will be your due."

A dilemma is usually described, as tho' it always proved the absurdity, inconvenience, or unreasonableness of some opinion or practice, and this is the most common design of it. But it is plain, that

that it may be used to prove the truth or advantage of any thing proposed. As, "In heaven we shall either have desires, or not : if we have no desires, then we have full satisfaction : if we have desires, they shall be satisfied as fast as they arise : therefore, in heaven we shall be completely satisfied."

This sort of argument may be composed of three or more members, and may be called *trilemma*. It is also called *sylogismus cornutus*, a horned syllogism ; its horns being so disposed, that if you avoid the one, you run against the other. It is also called *crocodilinus*, by reason that as the crocodile leads such as follow it, into the Nile, and pursues such as fly it, to destroy them ; so, whatever the adversary either affirms or denies in this kind of syllogism, is turned to his advantage.

**DILIGENZA**, in music, is used for a soft or sweet manner of singing or playing.

**DILL**, *ANETHUM*, in botany, a genus of the *pentandria digynia* class of plants, the compound flower of which is uniform ; the particular ones all consisting of five lanceolated petals, bending inwards : the fruit is naked, ovated, compressed, and separable into two parts ; and the seeds are two in number, sub-oval, convex, and striated on one side, and plane on the other.

To this genus Linnaeus likewise refers fennel, which differs only from dill, in that its seeds are not membranaceous at the edge, like those of dill.

The seeds of dill are recommended as good carminatives.

**DILLEMBURG**, a city of the circle of the Upper Rhine, in Germany, about forty miles north of Francfort, and subject to the house of Nassau : east long.  $8^{\circ} 8'$ , and north lat.  $50^{\circ} 45'$ .

**DILLENGEN**, a city of Swabia, in Germany, situated on the Danube, about twenty miles north east of Ulm : east long.  $10^{\circ} 20'$ , and north lat.  $48^{\circ} 40'$ .

**DILLENIA**, in botany, a genus of the *polyandria-polygynia* class of plants ; the corolla of which consists of five coriaceous, large, roundish, and hollow petals : the fruit is roundish, and externally covered with a number of cap-sules, which are oblong, and divided by a furrow ; within, there is a large column or pulpy receptacle : the seeds are numerous, and very small ; and nidulated underneath the capsules.

**DILUTE**. To dilute a body is to render it liquid ; or, if it were liquid before, to render it more so, by the addition of a thinner thereto. These things thus added, are called diluents, or dilutors. It is requisite for a diluent, that it be fluid, that it be more fluid than the liquor to be diluted ; and finally, that it retain its fluidity after a mixture. It is observed, that there is no body endued with these three properties besides water. Wine indeed is said to dilute ; but its diluent power depends on its quality, joined with its stimulating force. Water, if it be made warm, dilutes the more.

**DIMACHÆ**, in ancient military affairs, a kind of horsemen, answering to the dragoons of the moderns. See the article **DRAGOONS**.

**DIMACHÆRUS**, in antiquity, a gladiator who fought with two swords.

**DIMENSION**, in geometry, is either length, breadth, or thickness ; hence a line hath one dimension, *viz.* length ; a superficies two, *viz.* length and breadth ; and a body, or solid, has three, to wit, length, breadth and thickness.

**DIMENSION** is also used with regard to the power of the roots of an equation, which are called the dimensions of that root ; as in a cubic equation, the highest power has three dimensions, &c.

**DIMETIENT**, a term used by some for diameter. See the article **DIAMETER**.

**DIMINISHED COLUMN**, in architecture. See the article **COLUMN**.

**DIMINISHED INTERVAL**, in music, is a defective interval, or an interval that is short of its just quantity, by a lesser semitone, &c. See **INTERVAL**.

**DIMINUTION**, in architecture, a contraction of the upper part of a column, by which its diameter is made less than that of the lower part.

It generally commences from one third of the height of the column. Vitruvius would have the diminution of columns different according to their height, and not according to their diameter. But this rule is not found to have been observed in the antique. Mr. Perrault observes, that a difference of orders does not infer a difference in diminutions, and Mr. Le Clerc says, all diminutions of columns ought to be more or less sensible according as the orders are more or less delicate. For instance, in the Tuscan order, where the column is fifteen modules high, the diminution under the astragal may be five minutes

minutes and a half. In the Doric order, where the column is sixteen modules, the diminution may be but five minutes. In the Ionic, where the column is eighteen modules, the diminution may be but four minutes and a half; and in the Corinthian, no more than four. Diminutions are as differently adjusted in antique buildings, as in different modern authors.

**DIMINUTION**, in heraldry, a term used for what the french call brisures, and we denominate differences. See the article DIFFERENCE.

**DIMINUTION**, in law, is where the plaintiff or defendant in a writ of error alleges to the court, that part of the record remains in the inferior court not certified, and therefore prays, that it may be certified by certiorari. Diminution cannot be alleged of what is fully certified, but of something that is wanting, as the want of an original, or a warrant of attorney.

**DIMINUTION**, in music, is when there are several words which are to make tones, and several quick motions in a cadence, several quavers, semi-quavers, &c. corresponding to a crotchet or minim, as when a semi-breve is divided into two minims, four crotchets, &c. Of this there are several kinds, and if done in conjoint degrees, it is called trilli, tremoli, circoli mezzi, group, tirate, and if in disjoint degrees, it is said to be done per salto. See the articles TRILLI, TREMOLI, SALTO, &c.

**DIMINUTION**, in rhetoric, the exaggerating what you have to say by an expression that seems to diminish it.

**DIMINUTIVE**, in grammar, a word formed from some other, to soften or diminish the force of it, or to signify a thing is little in its kind. Thus cellule is a diminutive of cell, globule of globe, hillock of hill. The Italians abound in diminutives: the French are a good deal more reserved: in english we have very few. The Latins, and especially Catullus, use them as expressions of blandishment, and in that language, as well as in the Italian, French and English, they are generally formed from primitives by the addition of a few letters or syllables. They have a very pretty effect in that celebrated address of Adrian to his departing soul, which begins,

*Animula, vagula, blandula,  
Hospes comesque corporis, &c.*

**DIMISSORY LETTERS**, in the antient christian church, were letters granted to the clergy, when they were to remove from their own diocese, and settle in another, to testify that they had the bishop's leave to depart. In the canon-law, dimissory letters are such as are used when a candidate for holy orders has a title in one diocese, and is to be ordained in another: in which case the proper diocesan sends his letters directed to the ordaining bishop, giving leave that the bearer may be ordained to such a cure within his district. Persons inferior to bishops cannot grant these letters, unless by special commission; or unless the bishop be at a great distance, in which case the vicar general may grant such licence; as the chapter may do, *sede vacante*.

**DIMOERITÆ**, in church-history, a name given to the Apollinarians, from their separating the understanding from the human soul of Christ.

**DIMNESS OF SIGHT**, a disorder in horses, proceeding from blood-shot eyes. If the ball of the eye be found, the cure is effected by keeping the horse warm, with a hood of linnen cloth fitted to his head; and anointing the eyelids twice a day, with a composition of sugar-candy, honey, and white rose-water. In two or three days, the eyes will be well again, after which the creature should be blooded.

In this disorder, you ought by no means to clip or meddle with the bladders on any part of the eye.

**DIMORPHOTHECA**, in botany, a name used by Vaillant, for the calendula of Linnæus. See the article CALENDULA.

**DINANT**, a town of Germany, in the bishopric of Liege, situated on the river Maese, about twelve miles south of Namur: east long. 4° 50', and north lat. 50° 18'.

**DINANT** is also the name of a town of Britany, in France, about ten miles south of St. Malo: west long. 2° 5', and north lat. 48° 30'.

**DINGELFING**, a town of Bavaria, in Germany, situated on the river Isar, twenty miles south of Landshut: east long. 12° 40', and north lat. 48° 30'.

**DINGLE**, a port town of Ireland, in the county of Derry, and province of Munster, situated on Dingle-bay, 74 miles west of Limerick: west long. 10° 18', and north lat. 52°.

**DINGWEL**, or **DINGWAL**, a parliament-town of Scotland, situated at the west end of the Cromarty-bay, in the county of Ross : west long.  $4^{\circ} 15'$ , north lat.  $57^{\circ} 56'$ .

It classes with Dornoch, Wick, and Kirkwall.

**DINKELSPIEL**, a city of Swabia, about forty miles north of Ulm. east long.  $10^{\circ} 12'$ , and north lat.  $49^{\circ}$ .

**DINNER**, the meal taken about the middle of the day.

It is generally agreed to be the most salutary to make a plentiful dinner, and to eat sparingly at supper. This is the general practice among us. The French, however, in imitation of the antient Romans, defer their good cheer to the evening, and Bernardinus Paternus, an eminent italian physician, maintains it to be the most wholesome method, in a treatise expressly on the subject.

The grand Tartar emperor of China, after he has dined, makes publication by his heralds, that he gives leave for all the other kings and potentates of the earth to go to dinner, as if they waited for his leave.

**DINUS**, a name used by some physicians for a vertigo. See the article **VERTIGO**.

**DIOCALLIA**, in botany, a name sometimes used for chamæmile. See the article **CHAMÆMILE**.

**DIOCESE**, denotes a particular district, or division, under the direction and government of a bishop.

It is the general opinion, that the christian church, in the modelling her own external polity, followed the state and division of the roman empire, and that the ecclesiastical magistracy was originally formed upon the plan of the civil. As the empire therefore was divided into provinces and dioceſes, (a dioceſe, according to Constantine's distribution, comprehending several provinces under the direction of a general magistrate) so the church set up her metropolitical and patriarchal power, the metropolitan bishops answering to the civil magistrates of provinces, and the patriarchs to the civil magistrates of dioceſes. This is to be understood of the state of the church, after the empire became christian. See the articles **METROPOLITAN**, **PATRIARCH**, **PROVINCE**, &c.

Some pretend that a dioceſe, during the three first centuries, was never more than such a number of people as could meet, and ordinarily did meet, in a single con-

gregation : others extend the limits of the antient dioceſes, so as to include a whole city, and the region about it. And this is the plain reason of that great difference we find in the extent of antient dioceſes, some being very large, others very small, according as each city happened to have a larger or lesser territory under its jurisdiction. Dioceſes were originally called *παροικιαί*, parishes, by which name is to be understood the episcopal city, with the country places and villages round it. The name dioceſe began first to be used in the fourth century, when the exterior polity of the church began to be formed upon the model of the roman empire.

England in regard to its ecclesiastical state, is divided into two Provinces, *viz.* Canterbury and York, and each Province into subordinate dioceſes, of which there are twenty-two in England, and four in Wales.

**DIOCLESIAN EPOCH**, in chronology. See the article **EPOCH**.

**DIOLIA**, *διολία*, in grecian antiquity, a festival kept in honour of Diocles, who died in defence of a youth he loved.

**DIOCTAHEDRIA**, in natural history, a genus of pellucid and crystalliform spars, composed of two octangular pyramids, joined base to base, without any intermediate column. Of these some have long pyramids, others short and sharp-pointed ones, and others short and obtuse-pointed ones ; the two former species being found in the hartz-forest, and the last in the mines of Cornwall.

**DIODIA**, in botany, a genus of the *dynamia-angiospermia* class of plants, the corolla of which consist of a single petal, of the ringent kind. The tube is slender and longer than the cup, the upper lip is erect and bifid, the lower lip is patent, and divided into two lanceolated segments. The fruit is an oval quadrangular capsule, coronated, formed of two valves, and containing two cells : the seeds are single, of an ovato-oblong figure, smooth and flat on one side, and convex on the other.

**DIOECESIS**, *διοίκησις*, a dioceſe. See the article **DIOCESE**.

**DIONYSIA**, in grecian antiquity, solemnities in honour of *Διόνυσος*, or Bacchus, sometimes called by the general name of orgia ; and by the Romans, bacchanalia, and liberalia. See **BACCHANALIA**, &c. There were divers Dionysia observed, over all Greece : but those celebrated at Athens

Athen

Athens had more splendor and ceremonious superstition than in any other part; for the years were numbered by them: the chief archon had a share in the management of them, and the priests that officiated therein, were honoured with the first seat at public shews. But at first, they were without splendor and ornaments, being days set apart for public mirth, and observed only with the following ceremonies: first a vessel of wine, adorned with a vine branch, was brought forth, after that followed a goat; then was carried a basket of figs; and after all the phalli. At some of them, it was usual for the worshippers in their garments and actions to imitate the poetical fictions concerning Bacchus. They put on fawn skins, fine linnen and mitres, carried thyrsi, drums, pipes, flutes, and rattles, and crowned themselves with garlands of trees, sacred to Bacchus, such were the ivy, vine, fir, &c. Some imitated Silenus, Pan, and the Satyrs; exposing themselves in comical dresses, and antic motions: some rode upon asses, others drove goats to the slaughter. In this manner, persons of both sexes ran about the hills, desarts, and other places, wagging their heads, dancing in ridiculous postures, filling the air with hideous noises and yelling, personating people distracted, and crying aloud *Εὐοι Ἰαβοι, εὐοι Βακχε, or ὦ Βακχε, or Ἰο-βακχε, or ἰω Βακχε.*

In some of the festivals, a company of men called *Περιφάλλια*, carried long poles, at the end of which were fixed things in form of a man's privities. The *λακίον*, or mystical fan of Bacchus, was a thing essential to all his feasts.

**DIONYSIACA**, in grecian antiquity, an appellation given to all manner of theatrical entertainments, from their being sacred to Dionysius, or Bacchus.

**DIONYSIAN PERIOD**, in chronology. See the article **PERIOD**.

**DIOECIA**, in the Linnæan system of botany, the twenty-second class of plants, comprehending all those which have the male and female parts of fructification, or the stamina and pistil, on distinct plants of the same kind; in which respect, they bear some analogy to quadrupeds, whose males and females are likewise distinct. See **BOTANY**.

To this class belong the willow, hemp, poplar, juniper, pistachia, yew, &c. in all which, the female plants alone produce seeds; but even these prove

barren, unless planted near the male plants, so as to be within the reach of the farina fecundans. See **FARINA**.

**DIOMEDIS AVIS**, in ornithology, a bird of the duck-kind, about the size of the common hen, and of a dusky brown colour, said to be peculiar to the island Diomedea, or Tremiti, in the gulph of Venice.

**DIOPTER**, **DIOPTRA**, a name sometimes used for the hole pierced in sights of mathematical instruments. See **SIGHTS**.

**DIOPTRA**, among surgeons, the same with speculum. See **SPECULUM**.

**DIOPTRICS**, the science of refractive vision, or that part of optics which considers the different refractions of light in its passing through different mediums, as air, water, glass, &c. and especially lenses. See the articles **REFRACTION**, **LENS**, &c.

**DIOSCOREA**, in botany, a genus of the *dioecia-hexandria* class of plants, having no corolla in either the male or female flowers: the fruit is a compressed large capsule, of a triangular form, containing three valves, and divided into three cells: the seeds are two, compressed, and surrounded, with a large membranaceous margin.

**DIOSCURIA**, *διοσκυρια*, in grecian antiquity, a festival kept in honour of the Dioscouri, or Castor and Pollux, wherein the assistants shared plentifully of the gifts of Bacchus.

**DIOSMA**, in botany, a genus of the *pentandria-monogynia* class of plants, the flower of which consists of five obtusely-ovate, sessile, and erecto-patent petals, of the length of the cup: the fruit is composed of five capsules, adhering together by their inner sides, and containing each a single, oblong, and sharp-pointed oval seed.

**DIOSPOROS**, a name antiently used for lithospermum, or gromwell.

**DIOSPYROS**, in botany, a genus of the *octandria-digynia* class of plants, called by Turnefort, guaiacana, the flower of which is monopetalous, very small, and of an oval campanulated figure: the fruit is a large globose and multilocular berry, containing a few sharp-pointed oval seeds. See plate **LXXIII.** fig. 1.

**DIOTA**, a name used by some chemists for a circulating or double vessel.

**DIOTOTHECA**, in botany, the same with the morina of Linnæus. See the article **MORINA**.

**DIPHRYGES**, in antient pharmacy, the scoræ, sediment, or calx of melted copper, gathered in the furnace, when the metal was run out.

There are supposed to be three species of diphryges, one made of a clay, or bole dried in the sun ; another made of marcasite, or pyrites burnt ; and a third, that of the fæces of copper. See the article **COPPER**.

The last diphryges, which tastes of copper, is æruginous, astringent, and vehemently drying upon the tongue, qualities of which burnt oker, though sold for diphryges, is destitute. It is an astringent, a potent cleanser, absterfivè and drier, represses excrescences of flesh, induces malignant and spreading ulcers to cicatrize, and mixed with turpentine, or cerate, discusses an abscess.

**DIPHTHONG**, διφθόγγα, in grammar, a double vowel, or the mixture of two vowels pronounced together, so as to make one syllable. See the article **VOWEL**.

The Latins pronounced the two vowels in their diphthongs, *ae* or *æ*, *oe* or *œ*, much as we do, only that the one was heard much weaker than the other, though the division was made with all the delicacy imaginable. Diphthongs, with regard to the eyes, are distinguished from those with regard to the ears : in the former, either the particular sound of each vowel is heard in the pronunciation, or the sound of one of them is drowned ; or, lastly, a new sound, different from either, results from both : the first of these only are real diphthongs, as being such both to the eye and the ear. Diphthongs with regard to the ear are either formed of two vowels, meeting in the same syllable, or whose sounds are severally heard ; or of three vowels in the same syllable, which only afford two sounds in the pronunciation. English diphthongs, with regard to the eye and ear, are *ai*, *au*, *ea*, *ee*, *oi*, *oo*, *ou*. Improper english diphthongs, with regard to the eye only, are *aa*, *ea*, *eo*, *eu*, *ie*, *ei*, *oa*, *oe*, *ue*, *ui*. *Steele's Eng. Gr.*

**DIPHYES**, among natural historians, an appellation given to stones resembling the male and female parts of generation in mankind.

**DIPLASIASMUS**, in medicine, a reduplication of diseases.

**DIPLASIASMUS** is also used for two muscles of the arm, which serve to turn it round.

**DIPLOE**, in anatomy, the soft medullarium, or medullary substance, which lies be-

twixt the two laminæ of the bones of the cranium. See the article **CRANIUM**.

**DIPLOMA**, an instrument or licence given by colleges, societies, &c. to a clergyman to exercise the ministerial function, or to a physician to practise the profession, &c. after passing examination, or admitting him to a degree.

**DIPLOMA**, in chemistry, &c. a double vessel. To boil in diplomate, is to set one vessel, containing the ingredients intended to be acted upon, in another larger vessel, full of water, and to this last the fire is to be applied.

**DIPONDIIUS**, in the scripture-language, is used by St. Luke to signify a certain coin, which was of very little value: our translation of the passage is, *Are not two sparrows sold for two farthings?* In St. Matthew, who relates the same thing, we read, *Are not two sparrows sold for a farthing?* The greek reads *assarion* instead of *as*. See **AS**.

Dr. Arbuthnot says that this coin was at first *libralis*, or of a pound weight, and that even when diminished, it retained the name *libella* ; so that dipondius denoted two ases.

**DIPPING**, among miners, signifies the interruption, or breaking off, of the veins of ore ; an accident that gives them a great deal of trouble before they can discover the ore again.

**DIPPING NEEDLE**, or **INCLINATORY NEEDLE**. See the article **NEEDLE**.

**DIPSACUS**, TEASEL, in botany, a genus of the *tetrandria-monogynia* class of plants, the flower of which consists of only one tubular erect petal, divided into four segments at the mouth ; its fruit is a common receptacle, of a conical figure, beset with long scales, and containing a single columnar seed with a marginaceous rim. See plate **LXXIII.** fig. 2.

The leaves of wild teasel are recommended against flatulencies, and crudities of the stomach. See **TEASEL**.

**DIPSACUS**, in medicine, a term used by some for a diabetes. See **DIABETES**.

**DIPSAS**, in zoology, a species of serpent, so called from its bite creating a thirst that proved mortal. See **SERPENT**.

**DIPTERE**, or **DIPTERON**, in the antient architecture, signified a temple surrounded with two rows of columns, which form a sort of porticos, called wings, or isles. Pseudo-diptere is the same, except that instead of the double row of columns, this was only encompassed with a row of single ones.

**DIPTOTES**,

Fig. 1. DIOSPYROS.

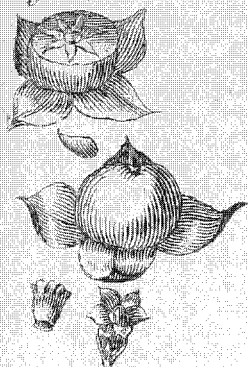


Fig. 2. DIPSAEUS, TEASEL.

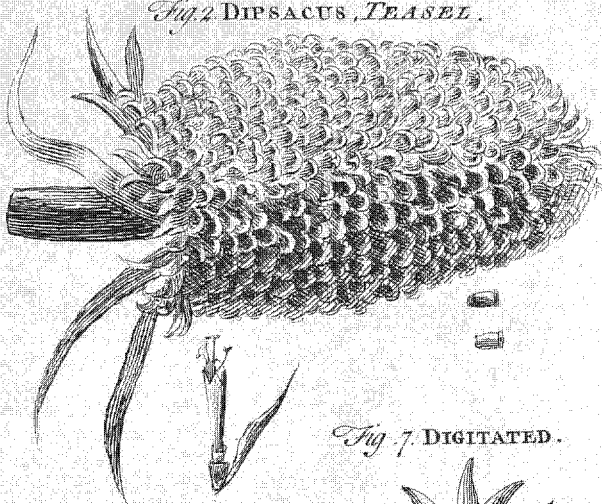


Fig. 7. DIGITATED.

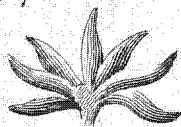
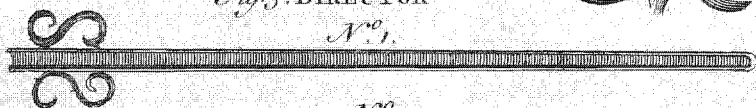
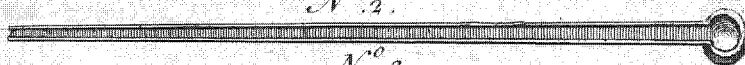


Fig. 3. DIRECTOR  
N<sup>o</sup>. 1.



N<sup>o</sup>. 2.



N<sup>o</sup>. 3.



Fig. 5. DISPLAYED.



Fig. 4. DIRIGENT.

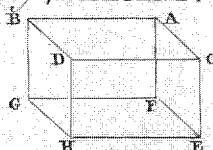
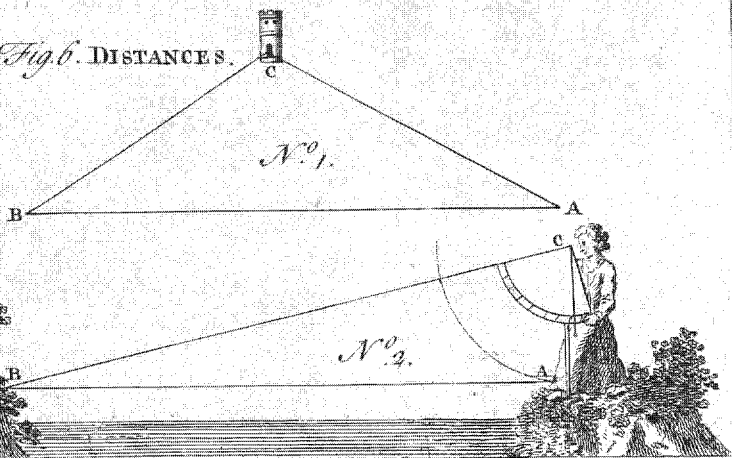


Fig. 6. DISTANCES.







**DIPTOTES**, in grammar, are such nouns as have only two cases, as *suppetia*, *suppetias*, &c.

**DIPTYCHS**, διπτυχα, in antiquity, a public register, in which were written the names of the consuls and other magistrates among the heathens; and among the christians, they were a sort of tablets, on one of which were written the names of the deceased, and on the other those of the living patriarchs, bishops, &c. or those who had done any service to the church, for whom prayers were offered, the deacon reading the names at mass.

It is certain there were prophane diptycha in the greek empire, as well as sacred ones in the greek church. The prophane diptycha were frequently sent as a present to princes, &c. on which occasion they were finely gilt and embellished, and usually of ivory. Carrion supposes that such presents were at first made to persons who had been nominated quæstors, to whom they were useful. Hence arose the custom of diptycha in the antient christian church; where some distinguish three sorts of diptycha, one wherein the names of bishops only were written, such especially as had been governors of that particular church; a second, in which the names of the living were written, such in particular as were eminent for any office or dignity, or some benefaction or good work, in which rank were bishops, emperors, and magistrates: lastly, a third, containing the names of such as were deceased in catholic communion. To erase a person's name out of these books, was the same thing as declaring him a heretic, or some way deviating from the faith.

**DIRECT**, in arithmetic. The rule of three direct, is opposite to the rule of three inverse. See the articles **RULE OF THREE** and **PROPORTION**.

**DIRECT**, in astronomy. A planet is said to be direct, when it appears to an observer on the earth to go forward in the zodiac, or according to the succession of the signs. See the article **PLANET**.

**DIRECT**, in matters of genealogy, is understood of the principal line, or the line of ascendants and descendants; in contradistinction to the collateral line. The heirs in the direct lines always precede those in the collateral lines.

**DIRECT RAY**, in optics, is a ray flowing from a point of a visible object directly to the eye, thro' one and the same medium.

**DIRECT east and west dials**, dials drawn upon planes that directly face the east and

west points of the horizon, or parallel to the meridian. See **DIAL**.

**DIRECT south and north dials**, are those which face directly the north and south points of the horizon, or parallel to the prime vertical circle. See the articles **DIAL** and **DIALLING**.

**DIRECT SPHERE**. See **SPHERE**.

**DIRECTION**, in mechanics, signifies the line or path of a body's motion, along which it endeavours to proceed, according to the force impressed upon it. See the articles **LINE** and **MOTION**.

*Angle of DIRECTION*, that formed by the lines of direction of two conspiring powers.

*Quantity of DIRECTION*, a term used by some mathematicians for the product of the velocity of the common center of gravity of a system of bodies, by the sum of their quantities of matter: this is nowise altered by any collisions among the bodies themselves.

*Magnetical DIRECTION* denotes the tendency of the load-stone, and other magnetic bodies, to certain points called their poles: thus, a magnetical needle always presents one of its ends towards the north pole of the world, and the other towards the south pole.

**DIRECTLY**. See **DIRECT**.

**DIRECTOR**, in commercial polity, a person who has the management of the affairs of a trading company: thus we say the directors of the India-company, South-sea-company, &c. See the article **COMPANY**.

The directors are considerable proprietors in the stocks of their respective companies, being chosen by plurality of votes from among the body of proprietors. The dutch East-india company have sixty such directors; that of France, twenty-one; the british East-india company has twenty-four, including the chair-man, who may be re-elected for four years successively. These last have salaries of 150 l. a year each, and the chair-man 200 l. They meet at least once a week, and commonly oftener, being summoned as occasion requires.

But besides these directors, who reside in Europe, and there superintend the general œconomy of the trading companies, there are also officers belonging to them in Asia, Africa, and America, under the title of directors-general, and, by an honourable abbreviation, generals. The English give these the title of presidents, whereof there used to be two in the East-indies,

indies, one at Surat, and the other at Bantam. They have the absolute disposal of all the company's effects, regulate their trade, establish new computing-houses, and command all the merchants, and even captains of ships; make presents to princes, treat with them, make peace and war with them, &c. It is true, they have a council, but one entirely subservient to their pleasure.

**DIRECTOR**, in surgery, a grooved probe, to direct the edge of the knife or scissars, in opening sinuses, or fistulæ, that by this means the subadjacent vessels, nerves, and tendons may remain unhurt. The ornament at the upper part of it, see plate LXXIII. fig. 3. n<sup>o</sup> 1. serves for a handle; tho' sometimes that end is made in the form of a spoon, as in n<sup>o</sup> 2. to contain powders to sprinkle upon wounds or ulcers: sometimes also it is forked at the end, to divide the frænum of the tongue, as in n<sup>o</sup> 3.

**DIRECTOR**, in anatomy, the same with the erector penis. See **ERECTOR**.

**DIRECTRIX**, in geometry, the same with dirigent. See the next article.

**DIRIGENT**, or **DIRECTRIX**, a term in geometry, signifying the line of motion, along which the describent line or surface is carried in the genesis of any plane or solid figure: thus, if the line AB (plate LXXIII. fig. 4.) move along the line AC, so that the point A always keeps in the line AC, a parallelogram, as ABCD, will be formed, of which the side AB is the describent, and the line AC the dirigent; so also, if the surface ABCD be supposed to be carried along CE, in a position always parallel to itself, in its first situation, the solid ADFH, will be formed, where the surface AD is the describent, and the line CE the dirigent.

**DIRITTA**, in music, a term intimating that the piece is to be played or sung in conjoint degrees: thus, contrapunto alla diritta, according to Angelo Berardi, is when one is obliged to raise or fall the voice by the same degree, *i. e.* by an equal number ascending or descending, without making a leap, even of the interval of a third.

**DIRSCHAW**, or **DIRCHAU**, a town of Prussia, in the palatinate of Culm, situated upon the Vistula, half way between Dantzic and Ghnief.

**DIS**, an inseparable article prefixed to divers words, the effect whereof is either to give them a signification contrary to

what the simple words have, as *disoblige*, *disobey*, &c. or to signify a separation, detachment, &c. as *disposing*, *distributing*, &c.

**DISABILITY**, in law, is when a person is rendered incapable of inheriting lands, or taking that benefit which otherwise he might have done.

Disability may happen four ways, *viz.* by the act of an ancestor, by the act of the party himself, by the act of God, or by the act of the law.

Disability by the act of an ancestor is where a man being attainted by treason or felony, his blood becomes corrupted, and thereby his children are rendered incapable to inherit.

Disability by the act of the party, is when one binds himself by obligation, that, upon the surrender of a lease, he will grant a new estate of the same premises to the lessee, and afterwards he grants over the reversion to another, whereby he is disabled to perform his obligation.

Disability by the act of God, is where a person is not *sana memorie*, not of sound memory, which incapacitates him to make any grant, &c. and in all cases where he gives or passes an estate from him, after his death, it may be disannulled and made void; though it is a maxim in our law, that a man of full age shall never be received to disabill his own person.

Disability by the act of the law, is where one, by the sole act of law, without any thing done by him, is rendered incapable of the benefit of the law, as an alien born, &c.

There are also, by the common law, other disabilities, as idiocy, infancy, and coverture, in respect to the making of grants, &c. and by statute in many cases; for papists are disabled to make any presentation to a church, or to purchase or take lands, &c. Officers not taking the oaths, to hold offices, &c.

**DISAFFORESTED**, the same with de-afforested. See **DEAFFORESTED**.

**DISARMING**, in law, the prohibiting people to wear arms. See **ARMS**.

It is an offence, by the common law of England, for persons to go or ride armed with dangerous and uncommon weapons: though gentlemen may wear common armour, according to their quality. It is also ordained by statute, that no persons shall come before the king's justices with force of arms, on pain of imprisonment, &c.

**DISARMING**,

**DISARMING** *the lips of a horse*, in the manege, is the preventing them from taking off the true pressure or appui of the mouth, when they happen to be so large as to cover the bars.

**DISBOSCATION**, the same with assart. See the article **ASSART**.

**DISBUDDING** of trees signifies the taking away such branches or sprigs, newly put forth, as are ill placed.

**DISBURDENING** of trees, the taking off part of the leaves and fruit, when too numerous, that those left may grow the larger.

**DISC**, *discus*, in antiquity, a quoit made of stone, iron, or copper, five or six fingers broad, and more than a foot long, inclining to an oval figure, which they hurled in the manner of a bowl, to a vast distance, by the help of a leathern thong tied round the person's hand who threw it, and put through a hole in the middle. Homer has made Ajax and Ulysses great artists at this sport; and Ovid, when he brings in Apollo and Hyacinth playing at it, gives an elegant description of this exercise, lib. x. ver. 175.

**DISC**, in astronomy, the body and face of the sun and moon, such as it appears to us on the earth; or the body or face of the earth, such as it appears to a spectator in the moon, &c. See **DIAMETER**. The disc in eclipses is supposed to be divided into twelve equal parts, called digits: in a total eclipse of the luminaries, the whole disc is obscured; in a partial eclipse, only a part thereof.

If we imagine a plane to pass through the center of the earth, so that the line which joins the centers of the sun and earth, may be perpendicular to this plane, it will make on the surface of the earth a circle, which will separate the illuminated hemisphere of the earth from the dark. This circle, otherwise termed the circle of illumination, Mr. Keil calls the illuminated disc of the earth, which is directly seen by a spectator placed at the distance of the moon, in the right line which joins the centers of the sun and earth. All lines drawn from the center of the sun to every single point of the disc are to be accounted parallel; and, therefore, since that line which is drawn to the center of the disc is perpendicular to it, all the rest will be perpendicular to it, and therefore all lines drawn from the center of the sun, and passing through every point of any circle upon the earth's surface, when they are produced, will be perpen-

dicular to the plane of the disc. Moreover, a spectator in the moon will see all countries, cities, and towns to move upon the disc, which motion is occasioned by the earth's rotation round its axis, and every point will have its way on the disc: the bigness of the earth's disc is to be estimated by the angle under which the earth is seen from the moon. See **EARTH**.

**DISC**, in botany, is an aggregate of florets forming, as it were, a plane surface.

**DISC**, in optics, is the width of the aperture of telescopic glasses, whatever their form be, whether plain, convex, concave, &c.

**DISC**, in the liturgy of the greek church, is nearly the same with the patena in the latin church. See **PATENA**.

**DISCEIT**, or **DECEIT**. See **DECEIT** and **DECEPTIONE**.

**DISCENT**, or **DESCENT**. See the article **DESCENT**.

**DISCERNING**, or **DISCERNMENT**, among logicians, a faculty of the mind, whereby it distinguishes between ideas. See **JUDGMENT** and **INTUITION**.

On this depends the evidence and certainty of several, even general, propositions, which pass for innate truths, that, in reality, proceed from this clear discerning faculty of the mind, whereby it perceives two ideas to be the same, or different. In being able nicely to distinguish one thing from another, consists, in a great measure, that exactness of judgment, and clearness of reason, which is observable in one man above another. To the well distinguishing our ideas it chiefly contributes that they be clear and determinate; and when they are so, it will not breed any confusion or mistake about them, though the senses should convey them from the same object differently on different occasions. *Locke*.

**DISCIPLE**, one who learns any thing from another: thus, the followers of any teacher, philosopher, &c. are called disciples. In the christian sense they were followers of Jesus Christ, in general; but in a more restrained sense, the disciples denote those alone who were the immediate followers and attendants on his person, of which there were seventy or seventy-two. The names *disciple* and *apostle* are often synonymously used in the gospel-history, but sometimes the apostles are distinguished from disciples as persons selected out of the number of disciples, to be the principal ministers of his religion; of these there were only twelve. The Latins kept the

the festival of the seventy or seventy-two disciples on July 15, and the Greeks on January 4.

**DISCIPLINE**, in a general sense, denotes instruction and government, as military discipline, ecclesiastical discipline, &c. Ecclesiastical discipline consists in putting those laws in execution by which the church is governed, and inflicting the penalties enjoined by them against the several sorts of offenders that profess the religion of Jesus: the primitive church never pretended to exercise discipline upon any but such as were within her pale, in the largest sense, by some act of their own profession; and even upon these she never pretended to exercise her discipline so far as to cancel or disannul their baptism: all that she pretended to, was to deprive men of the benefits of external communion, such as public prayer, receiving the eucharist, and other acts of divine worship. The church discipline was only confined to the admonition of the party, and to the lesser and greater excommunication.

As to the objects of ecclesiastical discipline, they were all such delinquents as fell into great and scandalous crimes after baptism.

Discipline, in a more peculiar sense, is used for the chastisements, or bodily punishments inflicted, on a religious of the romish church who has been found a delinquent; or even for that which the religious voluntarily undergo or inflict on themselves, by way of mortification.

**DISCLAIMER**, in law, is a plea wherein is contained an express denial of a thing; as where upon the distress of a lord, a tenant sues a replevin, and the lord avows the taking, by alledging the tenant holds of him as of his lord, and that he distrained for the rent unpaid, or service not performed: in this case, if the tenant denies that he holds of him, this is called a disclaimer; and on that account, if the lord proves the tenant to hold of him, the tenant, on a writ of right, shall lose his land. There is likewise a disclaimer of goods, as when a person arraigned of felony, disclaims the goods charged on him; though he should be acquitted, he loses the goods. When a defendant in his answer in chancery, denies his having any interest in the thing in question, it is also a disclaimer; and to these may be added a disclaimer or renouncing an executorship of a will, or the right to an administration,

**DISCLOSED**, a term used to signify buds or flowers just blown; also chickens newly hatched. See the articles **BUD**, **FLOWER** and **HATCHING**.

**DISCOIDES TRIBULA**, a genus of the echini-marini, or sea hedge-hogs. See the article **ECHINITES**.

**DISCONTINUANCE**, in law, signifies an interruption or cessation of the course of a thing, and is of two kinds. 1. Discontinuance of estate or possession, which has this effect, that a person may not enter upon his own land, &c. aliened, whatever his right be to it, of his own authority, but must bring his writ, and seek to recover possession by law. A discontinuance may be by seoffment, fine, recovery, lease, and confirmation with warranty; but grants of land without livery, or if made in fee without any warranty, are not discontinuances. 2. Discontinuance of process, where the opportunity to prosecute a suit is lost, or the plaintiff is, put *sine die*, and dismissed the court. After a verdict in a cause, no discontinuance is allowed without leave of the court, and costs are usually given the defendant on discontinuing suits. As discontinuance of process is helped by appearance at common law, so all discontinuances and miscontinuances of the plaintiff or defendant, are cured after verdict by statute.

**DISCONTINUANCE of plea**, is when divers things should be pleaded to in a suit or action, and some thereof are omitted in the pleading. Where a defendant's plea answers to part only, it is a discontinuance as to the part not answered, and the plaintiff may take judgment by *nil dicit* for that. But if the plaintiff pleads over thereto, the whole action is discontinued.

**DISCORD**, in music, the relation of two sounds which are always and of themselves disagreeable, whether applied in succession or consonance. Thus the second, fourth, and seventh, with their octaves, and, in general, all intervals, except those few which precisely terminate the concords, are called discords. Discords are distinguished into concinnous and inconcinnous intervals. See the article **INTERVAL**.

**Concinnous DISCORDS**, called by the antients *emmeli*, are such as are fit for music, next to and in combination with concords. These are relations which in themselves are neither very agreeable nor disagreeable, and have only a good effect in music, as by their mixture and combina-

tion with the more natural and essential principles, they produce a variety necessary to our being better pleased.

*Inconcinuous* DISCORDS, by the antients called *ecmeli*, are such as are never chosen in music, as having too great a harshness in them, though even the greatest discord is not without its use. The essential principles of harmony, harmonical intervals, or concords, are in number only eight: the indefinite numbers of other ratios are all discords. Hence Mr. Malcolm shews the necessity of taking some of the less untoward of these discords into the system of music. In order to this, he considers the effect of having none but harmonical intervals in the system of music. 1. With respect to a single voice. If that should move always from one degree to another, so as every note or sound to the next were in the ratio of some concord, not only the variety, which is the life of music, would be soon exhausted, but the very perfection of such relation of sounds would clog the ear, in the same manner as sweet and luscious things do the taste. 2. With respect to music in parts, that is, where two or more voices join in consonance, the general rule is, that the successive sounds of each be so ordered, that the several voices shall be all concords. Now there ought to be a variety in the choice of those successive concords, and also in the method of their succession; all which depends on the movement of the single parts. So that if these could only move in an agreeable manner by harmonical distances, there are but few different ways wherein they could move from concord to concord, and hereby we should lose much of the ravishment of sounds in consonance. A variety, therefore, is requisite, by which each single voice, or more in consonance, may move agreeably in the successive sounds, so as to pass from concord to concord, and meet at every note in the same or a different concord, from what they stood in at the last note. From these two considerations, it appears how imperfect music would be without any other intervals than concords; but in what cases, and for what reasons discords are allowed, the rules of composition must teach. See HARMONY. Besides the concinuous discords used designedly in music, there are several other discord relations which happen unavoidably in an accidental and indirect manner. Thus in the succession of several

notes, there are to be considered not only the relations of those which succeed others immediately, but also of those, betwixt which others intervene. Now the immediate succession may be conducted so as to produce melody; and yet among the distant notes there may be very gross discords, that would not be tolerable in mediate succession, and far less in consonance. Thus taking any one species, for example; that with the greater third, and marking the degrees between each term and the next, though the progression be melodious, as the terms refer to one common fundamental, yet there are several discords among the mutual relations of the terms, *e. g.* from the fourth to the seventh greater is 32:45, and from the second greater to the sixth greater is 27:40, and from the second greater to the fourth is 27:32, all discords.

Discords may transiently pass upon the unaccented part of a measure, without great offence to the ear. This is called supposition. See SUPPOSITION.

The harmony of discords, is that wherein the discords are made use of as the solid and substantial part of the harmony. For by a proper interposition of a discord, the succeeding concords receive an additional grace. Thus the discords are in music, what strong shades are in painting. See the article HARMONY.

The discords are the fifth when joined with the sixth, the fourth with the fifth. The ninth of its own nature is a discord; so is the seventh. The discords are introduced into harmony with due preparations, and must be succeeded by concords, which is the resolution of discords. The discord is prepared by substituting it first in the harmony, in quality of a concord; that is, the same note which becomes a discord, is first a concord to the bass note immediately preceding that to which it is a discord. Again, a discord is resolved by being immediately succeeded by a concord, descending from it only by the distance of a greater or lesser second.

DISCOVERY, in dramatic poetry, a manner of unravelling a plot, or fable, in tragedies, comedies, and romances, wherein, by some unforeseen accident, a discovery is made of the name, fortune, quality, &c. of a principal person, which were before unknown. See CATASTROPHE. A discovery ought never to be in vain, by leaving those who remember one another in the same sentiments they were in

before: it must produce either love or hatred in the principal, not inferior characters.

Those discoveries which are immediately followed by a change of fortune, are the most beautiful, as they never fail to produce terror or pity, which is the end and aim of tragedy. Thus, OEdipus in Sophocles, from his discovery of being the son of Jocasta and Laius, immediately from the most happy becomes the most miserable of mortals. See the article PERIPETIA.

There are several sorts of discoveries: the first, by certain marks of the body, either natural or accidental, as that of Ulysses, who having received a wound in the thigh by a boar before the trojan war, is discovered by the old nurse, upon washing his legs, after his return home incognito. The second is by tokens, and is often used by Terence. The third is by remembrance. Thus when Ulysses heard Demodocus sing his actions at Troy, the memory of them drew tears from his eyes, and discovered him to Alcious. The fourth sort is made by reasoning; but the finest of all is that which arises from the subject or incidents of the fable; as that of OEdipus, from his excessive curiosity, and the letter that Iphigenia sent by Pylades.

**DISCOUNT**, in commerce, a term among traders, merchants, and bankers. It is used by the two former on occasion of their buying commodities on the usual time of credit, with a condition that the seller shall allow the buyer a certain discount at the rate of so much *per cent. per annum*, for the time for which the credit is generally given, upon condition that the buyer pays ready money for such commodities, instead of taking the time of credit. Traders and merchants also frequently taking promissory notes for monies due, payable to them or order at a certain time; and sometimes having occasion for money before the time is elapsed, procure these notes to be discounted by bankers before the time of payment; which discount is more or less, according to the credit and reputation of the person who drew the note, and the indorser or indorsers. Bills of exchange are also discounted by bankers, and in this consists one article of the profits of banking. See the article BANK.

The *seur de la Poste* informs us, that they make a distinction in France with regard to money due for the purchase and

sale of commodities, and on account of raising money by discounting bills of exchange; the latter being computed upon the principles of common interest by so much on the 100*l.* whereas that on commodities is not only laid on the 100*l.* but on the hundred and discount added together. The best tables of discount in our language, are those of Mr. Smart, founded upon the true principles of decimal arithmetic. By these it appears, that he who allows 5*l.* for the discount of 100*l.* for one year at 5 *per cent.* wrongs himself; for he ought to receive so much money as at 5 *per cent.* interest will amount to 100*l.* in one year, and the sum is 95*l.* 4*s.* 9½*d.*

**DISCOURSE**, *discursus*, among logicians, signifies the progressive exercise of reason in the search of truth; as when from self-evident principles it discovers the truth of something it did not know before; by means of this, a second; by that second, a third; and so on. See the article REASONING.

**DISCOURS FLOWERS**, those furnished with a disc. See the article DISC.

**DISCRETE**, or **DISJUNCT PROPORTION**, is when the ratio of two or more pairs of numbers or quantities is the same, but there is not the same proportion between all the four numbers. Thus if the numbers 3:6::8:16 be considered, the ratio between 3:6, is the same as that between 8:16, and therefore the numbers are proportional; but it is only discretely or disjunctly, for 3 is not to 6 as 6 to 8; that is, the proportion is broken off between 8 and 3, and is not continued as in the following continual proportionals, 3:6::12:24. See PROPORTION.

**DISCRETE QUANTITY**, such as is not continuous and joined together. Such is a number whose parts being distinct units, cannot be united into one continuum; for in a continuum, there are no actual determinate parts before division, but they are potentially infinite.

**DISCRETIONE**, in music, intimates to play or sing with attention and care.

**DISCRETIVE PROPOSITIONS**, are those where various judgments are made and denoted by the particles *but*, *notwithstanding*, &c. either expressed or understood. Thus, *fortune may deprive me of my wealth, but not of my virtue*, is a discrete proposition.

**DISCUS**, in antiquity, an instrument used by the ancients in their public games. It is certain it was used in the gymnastic

art for preserving health and strengthening the constitution ; but as to its form, its dimensions, and various uses, authors disagree. See the article *Disc*.

The same exercise was performed with an instrument called *σολος*, which some distinguish from the discus, because that was made of iron, and the discus of stone; while others distinguish them by the form, the *σολος* being spherical, and the discus broad.

**DISCUSSION**, in matters of literature, signifies the clear treating or handling of any particular point, or problem, so as to shake off the difficulties with which it is embarrassed : thus we say, such a point was well discussed, when it was well treated of, and cleared up.

**DISCUSSION**, in a medicinal sense, the same with diaphoresis. See *DIAPHORESIS*.

**DISCUTIENTS**, in medicine, are such remedies as, by their subtilty, dissolve a stagnating or coagulated fluid, and dissipate the same without an external solution of continuity.

Discutient compositions consist of emollients and attenuants ; in which intention mercury, cinnabar, opium, and camphor are greatly recommended. Discutients ought to be carefully distinguished from suppuratives. See *DISPERSION* and *SUPPURATIVES*.

**DISDIACLASTIC CRYSTAL**, the name by which Bartholin calls a fine pellucid spar, more properly called parallelopipedum from its shape. See the articles *CRYSTAL* and *SPAR*.

**DISDIAPASON**, or **BISDIAPASON**, in music, a compound concord, described by F. Parran, in the quadruple ratio of 4 : 1, or 8 : 2.

The disdiapason is produced when the voice goes diatonically from its first to its fifteenth sound, and may be called a fifteenth. The voice ordinarily does not go farther than from its first sound to the disdiapason ; *i. e.* it does not go beyond the compound, or double octave ; for the disdiapason is an octave doubled. The voice sometimes rises several degrees above the disdiapason, but the effort or struggle disfigures it, and makes it false. In reality, the antient scale or diagram extended only to a disdiapason.

**DISDIAPASON-DIAPENTE**, a concord in a sextuple ratio of 1 : 6.

**DISDIAPASON-SEMI-DIAPENTE**, a compound concord in the proportion of 16 : 3.

**DISDIAPASON-DITONE**, a compound consonance in the proportion of 10 : 2.

**DISDIAPASON-SEMI-DITONE**, a compound concord in the proportion of 24 : 5.

**DISEASE**, in medicine, that state of a living body, wherein it is deprived of the exercise of any of its functions, whether vital, natural, or animal.

Some authors have given us compendious theories of diseases : Bontekoe deduces all human diseases from the scorbutus : Musgrave, from the arthritis ; Dr. Woodward, from the bile ; some from the venereal virus, which has lurked in the seed ever since the sin of Adam ; some from extraneous ferments, formed in or out of us ; and some from worms.

As the actions or conditions of the body, so also the diseases or defects thereof may be reduced to three general heads, *viz.* those of the solids and fluids, and those compounded of both.

The solids, *i. e.* the bones and flesh, may disordered five ways, *viz.* rendered turgid by tumors, cut by wounds, corroded by ulcers, &c. removed out of their places, or discontinued by fractions and contusions.

Diseases of the fluids are in the blood or spirits. Those of the blood are two, such as thicken and retard its motion, or such as attenuate and accelerate it. To the last kind, the fever and feverish affections only belong : all other diseases of the blood belong to the former.

The diseases of the animal spirits arise either from an intermission or retardation of their motion ; or a diminution of their quantity ; or disorder in their quality. Lastly, diseases of the fluids, whether those of the blood or spirits, are seldom long confined thereto, but presently come to disturb and impede some of the functions of the solid parts, and at last corrupt the substance of the solids themselves : hence arise compound or complicated diseases, which are infinitely various. The learned Boerhaave furnishes us with an accurate and scientific division of diseases into those of the solids and fluids, to which we refer the reader.

All diseases are owing to the bad regulation of our lives, either from too much or too little sleep, too much or too little exercise, &c. Sometimes they are caused by things without, and very often by an abuse of food ; that is, by our intemperance in eating and drinking, which is so much the more injurious to us, because it affects us inwardly. See *REGIMEN*.

Mr. Hacquet rejects the system of the materialists, who considered all diseases as

*entia nova*, or new productions, and endeavours to account for all new modifications on a destruction of proportions, or a change in the structure of parts: he supposes the pressure, structure, and convulsion of the nerves affecting the fluids, to be the principal cause of distempers; and undertakes to prove, that the first operations of poisons and infections is on the spirits, and from them communicated to the blood.

To attain a complete history of diseases, such enquiries are to be made, and circumstances known, which show the genius and state of the disease; and the operations and effects of the medicines are to be carefully observed. A particular regard must be had to the symptoms which differ strangely in all different subjects, on account of the various constitutions of different bodies. It will therefore be necessary to enquire into the age, sex, structure, and habit of the body; or the acquired habit and strength of the patient; and whether he has an hereditary disposition to this or that disease. From the different constitution of the parts, arise the different state and mechanism of the solids and fluids, and a proneness to certain diseases; as also, the variety of manners and inclinations. In childhood, there is a remarkable softness of the fibres, a lax and thin habit, with an abundance of serum; young persons have tense and contractile fibres, with more hot blood, which is more apt for motion: those that are old have a great rigidity of the solids, and a straitness of the passages, vessels, and canals, with a falso-sulphureous dyscrasy of the humours. Likewise, regard must be had to the female sex, for they are not only obnoxious to distinct diseases, which arise from disorders of the menses and child-bearing, but the system of their nerves is likewise more weak: whence they are more liable to spastic and convulsive disorders, and are more easily restored to health than men. See *MENSES, PREGNANCY, &c.* It is likewise proper to know whether the patient be of a lax or tense habit of body, whether the vessels are slender and numerous, or large and few; because in narrow and slender canals, the progressive motion of the fluids is more difficult, as well as the secretions and excretions: for these are more quick and ready when the fibres are tense, and the vessels pretty large. Whence we may observe, that they are more liable to disorders, and

grow well with more difficulty, whose fibres are more strong, and whose circulation of the fluids is more quick. The same may be said of lean and fat persons. Regard must also be had to the colour of the face and skin. A fair, florid, and clear complexion, show the purity of the lymphatic fluids; if it be livid, lurid, and yellow, they discover a salino-sulphureous impurity of the same, and a disordered secretion in the proper organs, especially in the liver. It appears from daily observation, that the debility, defects, and faults of the viscera and fibres, as well as diseases proceeding from thence, often descend to children; and the practitioner should be informed hereof: for hereditary imbecilities and weaknesses are more difficult to be cured, more readily return, and tire the physician's patience. It is likewise necessary to know the strength; whether the patient's spirits are low, especially in the beginning of an acute disease, for weaknesses and lownesses are then bad signs: but if the person is in strength and vigour, which appear from the motion and impulse of the fluids, there are great hopes of recovering health.

We are not only to examine the condition of the body, but the state of the mind, and what disorders it is liable to, because there is a wonderful connection between the mind and the body. For a greater tensility and mobility of the fibres and solids, dispose the mind to anger; whereas a laxity and defect of the vis-motrix, shows the person to be dispirited, timid, and fearful. On the other hand, anger increases the tone and contractions of the solids, and renders the fluids more impetuous; but timidity dissolves and defects the strength, whence the circulation of the fluids is more slow. Terror greatly constricts the surface and extreme parts of the body, and drives the blood to the interior and noble parts; that is, the præcordia and head; whence proceed grievous disorders, especially of the genus nervosum. The same may be said of sadness, which often proceeds from a defect of the viscera, and a faulty circulation of the fluids, as in the hypocondriac passion: but when its hurtful influence attacks the solid parts, it wonderfully defects the strength of the whole body, and hurts its functions, relaxing and lessening the strength of the fibres. See the articles *ANGER, TIMIDITY, TERROR, &c.*



If the mind is not composed, and at ease, but subject to various passions and commotions, diseases are cured with greater difficulty; therefore, enquiry is to be made whether the patient is not addicted to hard study, and to profound and fatiguing meditation: for it can hardly be imagined what a consent there is between the brain and its membranes, as well as between the stomach and the adjoining intestines. See *CONSENT of parts*.

Besides, it is necessary to consider the place where the patient lives, the nature of the air, and his usual diet. See the articles *AIR* and *DIET*.

Enquiry must be made into the kind of life: whether it be laborious or unactive, requiring exercise or sedentary; whether the person be a courtier, or a soldier; a student, or a tradesman; whether he be conversant among metals or minerals, or work at the fire: for every kind of life produceth particular diseases; thus brasiers are subject to diseases of the eyes; husbandmen, to those of the breast; makers of starch, to coughs and asthma; porters, to asthma, ruptures, and bursting of the vessels in the breast; tallow-chandlers, to diseases of the head and stomach; workers in tow, hemp, and silk, to shortness of breath; leather-dressers are generally cachectic and hydropical; runners of races are often troubled with a shortness of breath, and spit blood; carpenters are subject to sore eyes; night-men are apt to be blind; plasterers are subject to shortness of breath, and consumptions; washerwomen are liable to difficulties of breathing, and dropsies; makers of oil are cachectic and asthmatic; plumbers are subject to palsies; house-painters are generally valetudinarians, cachectic, and paralytic; fishermen have ulcers in their legs; bakers are subject to coughs, hoarseness, and lippitude, as well as a constipation of the pores; cutters of tobacco are subject to the vertigo; and the like.

Another thing to be examined is the excretions, for unless these are regular, health cannot be maintained; and therefore, if they are too plentiful, or defective and suppressed, they will cause various disorders. Regard is also to be had to perspiration, which carries off more matter than all emunctories besides. See *EXCRETION* and *PERSPIRATION*.

The practitioner should likewise enquire what diseases the patient has been subject to, at what time, and how cured; for

it often happens in the rash and imprudent cure of diseases, that terrible and dangerous symptoms are produced, and that the driving away one disease, is productive of a much worse.

Sometimes diseases are strangely complicated, inasmuch, that if the patient was affected with the hypocondriac passion, or a cachexy, scurvy, debility of the head, spitting of blood, consumption, piles, gravel, or gout, another distemper supervenes, which requires the utmost prudence, and a different method of cure.

It is likewise necessary to inquire whether the patient is plethoric, or cacochymic; what is the state of the stomach, and intestines; what is the condition of the liver, whether the circulation through it be impeded; whether the bile be duly secreted; what is the state of the lungs; and, lastly, the temperies of the brain, and nervous system, are to be considered. These things being mutually consulted, we must proceed to the disease itself, as whether it be common, or epidemic; whether the virulence appears on the skin in pustules, or otherwise. As there is no fever or other disease which has not sensible remissions and intermissions of the symptoms, the physician ought to know the state of the natural, vital, and animal functions, as well in, as out of the paroxysm.

In acute diseases, we may know the genius and force of the disorder, from the respiration, nature, and condition of the pulse; besides, as no patient dies without an inflammation and internal mortification, and as the inflammation of the stomach and membranes are produced easily in acute diseases, and in the chronic the mortifications of the viscera put a period to human life, the physician should carefully attend to these fatal symptoms, in order to manage the disease with greater certainty.

Likewise, the state of the *primæ viæ* is carefully to be examined, as whether they are replete with fordes; whether the body is costive, or otherwise, &c.

It is likewise necessary to observe the operations of the medicines, and what changes they produce, whether the force and vehemence of the symptoms mitigate or increase; or whether nothing of this kind happens. See *MEDICINE*.

Many diseases, and especially fevers of all kinds, attack the patient all at once, and are attended with particular symptoms, requiring sometimes one kind of management,

management, and sometimes another : therefore, the causes of these diseases can be nothing else but such as are common to many men, and equally affect them all. The most common of which is the unhealthy state of the air : but this alone is not sufficient for the generation of epidemic diseases ; for it is evident from observation, that, in the same climate, and the same constitution of the heavens, a disease shall infect the inhabitants of one place, and not another, as appears from the small-pox, dysenteries, and miliary fevers : wherefore, recourse must be had to the nature of exhalations from pools and marshy places, which are replete with sulphureous, vitriolic, aluminous, bituminous, saline, and other particles. Regard must likewise be had to the different way of living, and kinds of aliments, from whence the causes of epidemic diseases differ in their nature, matter, texture, power, and virtue ; and affect the structure and motion of the body in a preternatural manner : these causes and concurrent circumstances being known, an epidemic disease may be predicted, and the best methods of cure advised.

The method of distinguishing the various kinds of diseases, is affixed to our account of these diseases, as they occur under their several names, and is therefore omitted here.

**Endemic DISEASES.** See the article **ENDEMIC DISEASES**.

**Epidemic DISEASES.** See the article **EPIDEMIC DISEASES**.

**DISEMBOGUE**, in the sea-language, is said of a ship that passes out of a gulph or bay into the open sea : a river is also said to disembogue or discharge itself into the sea.

**DISERGOT**, in the manege. See the article **ERGOT**.

**DISFRANCHISING**, among civilians, signifies the depriving a person of the rights and privileges of a free citizen or subject. See **FRANCHISE**.

**DISGORING**, in the manege, the dispersing an inflammation or swelling. See the article **DISPERSION**.

**DISGUISE**, a counterfeit habit. Persons doing unlawful acts in disguise, are by our statutes sometimes subjected to great penalties, and even declared felons. Thus by an act, commonly called the black act, persons appearing disguised and armed in a forest, or grounds inclosed, or hunting deer, or robbing a warren or a fish-pond, are declared felons.

**DISH**, among miners, denotes a wooden measure, wherein they are obliged to measure their ore : it is kept by the bar-master, and contains about 672 solid inches. See **ORE**.

**DISHERISON**, a term used in old writers for disinheriting.

**DISJUNCT PROPORTION**, the same with that otherwise called discrete. See the article **DISCRETE**.

**DISJUNCTIVE**, something that separates or disjoins. Thus, *or, neither, &c.* which in connecting a discourse yet separates the parts of it, are called disjunctive conjunctions.

**DISJUNCTIVE PROPOSITION**, in logic, is that where of several predicates we affirm one necessarily to belong to the subject to the exclusion of all the rest, but leave that particular one undetermined. Such is the major of the following disjunctive syllogism.

The world is either self-existent, or the work of some finite, or of some infinite being.

But it is not self-existent, nor the work of a finite being.

Therefore it is the work of an infinite being.

**DISK**, or **DISC**. See the article **DISC**.

**DISLOCATION**, in surgery, the same with luxation. See **LUXATION**.

**DISMA**, a town of Japon, separated from Nanquesaque only by a narrow canal. The Dutch have a very fine magazine there.

**DISMEMBERED**, in heraldry, is applied to birds that have neither feet nor legs, and also to lions and other animals whose members are separated. See **MEMBERED**.

**DISMES**, *decime*, a term formerly used for tithes. See the article **TITHE**.

**DISMOUNTING**, in the military art, the act of unhorsing. Thus to dismount the cavalry, dragoons, &c. is to make them alight.

**DISMOUNTING CANNON**, is the breaking their carriages, wheels, axletrees, or any thing else, so as to render them unfit for service.

**DISORIENTATED**, a term chiefly used in speaking of dials, which have been some how altered from the situation of directly facing the east or any other of the cardinal points. See the articles **DIAL** and **DIALLING**.

**DISPARAGEMENT**, in our law, is properly used for the matching an heir in marriage under his degree, or against decency.

**DISPART**,

**DISPART**, in gunnery, is the setting a mark upon the muzzle ring, or thereabouts, of a piece of ordnance, so that a sight-line taken upon the top of the basering against the touch-hole, by the mark set on or near the muzzle, may be parallel to the axis of the concave cylinder. The common way of doing this, is to take the two diameters of the base-ring, and of the place where the dispart is to stand, and divide the difference between them into two equal parts, one of which will be the length of the dispart which is set on the gun with wax or pitch, or fastened there with a piece of twine or marlin. By means of an instrument it may be done with all possible nicety.

**DISPATCH**, a letter sent abroad by a courier on some affair of state, or other matter of importance. The business of dispatches lies upon the ministers of state and their clerks.

**DISPATCH** also signifies the packet or mail containing such letters.

**DISPAUPER**. A person suing in forma pauperis, is said to be dispaupered if, before the suit is ended, he has any lands or other estate fallen to him, or if he does any thing to make him lose his privilege. See the article **FORMA PAUPERIS**.

**DISPENSARY**, or **DISPENSATORY**, denotes a book containing the method of preparing the various kinds of medicines used in pharmacy. Such are those of Bauderon, Quercetan, Zwelfer, Charas, Bates, Mesue, Salmon, Lemery, Quincy, &c. but the latest and most esteemed are the Edinburgh and London Dispensatories. In compiling this last, the chief care of the college of physicians was to expunge the medicines no longer made use of in general practice, and to insert such as have come lately into esteem; and also to examine the articles they have retained or given admission to, both in regard to their pharmacæutic composition, and upon the genuine principles of medicine. The apothecaries in and about London are obliged to make up their compound medicines according to the formulas prescribed in the college dispensary, and are enjoined to keep always ready in their shops all the medicines there enumerated. See the article **PHARMACOPOEIA**.

**DISPENSARY**, or **DISPENSATORY**, is likewise a magazine or office for selling medicines at prime cost to the poor. The college of physicians maintain three of these in London, one at the college itself

in Warwick-lane; another in St. Peter's alley, Cornhill; and a third in St. Martin's-lane.

**DISPENSATION**, in law, the granting a license of doing some certain action that otherwise is not permitted.

The greatest dealer in dispensations is the pope, who claims the office *jure divino*, and extends it to every thing. The more moderate of the romanists themselves deny that he can give a dispensation for any thing contrary to the divine law, or the law of nature; and confine him to what is contrary to positive laws, or to things relating to fasts, marriages, holding several benefices, &c. and they limit him even in these things.

The archbishop of Canterbury has a power, by statute, of dispensing in any cause wherein dispensations were formerly granted by the see of Rome; and as well to the king as his subjects; and during the vacancy of the archbishop's see, the guardian of the spiritualities may grant dispensations. Every bishop of common right has the power of instituting into benefices, and of dispensing in common cases, &c. A dispensation of the king, makes a thing prohibited lawful to be done by the person that has it, though a thing evil in itself will not admit of a dispensation. And where the subject has an immediate interest in an act of parliament, the king cannot dispense with it; but may, if the suit be the king's own only, for the breach of a penal law that is not to the damage of a third person.

There is a dispensation by *non obstante*, which is where a statute tends to restrain some prerogative incident to the person of the king, as the right of pardoning, or commanding the service of the subjects for the benefit of the public, &c. each of which prerogatives are inseparable from the king, and therefore, by a clause *non obstante*, such a statute may be dispensed with. See the article **NON OBSTANTE**.

**DISPENSATORY**, or **DISPENSARY**. See the article **DISPENSARY**.

**DISPERSION**, in general, signifies the scattering or dissipating something. Hence, **DISPERSION**, in optics, the same with the divergency of the rays of light.

*Point of DISPERSION*, in dioptrics, the point from which refracted rays begin to diverge, where their refraction renders them divergent. See **REFRACTION**.

**DISPERSION of Inflammations**, in medicine and surgery, is the removing the inflammation.

inflammation, and restoring the inflamed part to its natural state.

Though the methods used to cure inflammations be various, according to the several causes and supervening symptoms, with other various circumstances, yet as the inflammation constantly arises from an inspissation of the blood in its smallest vessels, the grand intention of each of these methods should be, to open such small vessels as are thus obstructed, and to restore the blood to its natural consistence and free circulation.

If the cause of the inflammation is found to be external, and obvious to the senses, as thorns, splinters, the point of a sword, bullets, or any other foreign body stuck into the part, nothing can be more serviceable than speedily and carefully to remove whatever is lodged there, if it can be done with safety. So also, when the inflammation proceeds from too strait a bandage in wounds, &c. or from a luxation or fracture, the first and principal business is speedily to remove the bandage, or else set the fracture, or reduce the luxation.

When the external causes are once removed, and when the inflammation is great, and proceeds from internal causes, it is in both cases very useful to open a vein, either in the arm or foot, and to draw off a large quantity of blood proportionable to the strength and habit of the patient; giving afterwards a brisk purge, not one that heats the body, but judiciously accommodated to the age and constitution of the patient; and if the symptoms do not remit and grow milder, they must be repeated at discretion.

To resolve and attenuate the inspissated blood in the small vessels, benefit may arise from internal medicines, which are watry, diluent, cooling, and attenuating; but aliments which are of a difficult digestion, such as pickled or salted meats, with all spices and fermented liquors, or any thing else that may heat the blood, are to be altogether avoided. With regard to the regimen and diet, the most proper aliment seems to be broths and drinks, made with barley, oats, or flour; also viper's grass, succory, chervil, forrel, endive, apples, and vegetables of the like nature.

With regard to external medicines, it must be generally observed never to apply hot remedies to hot constitutions, nor the contrary. Among the domestic medicines cow's dung, fresh and warm,

mixt with warm vinegar, is an application of no small efficacy: the external medicines should always be applied hot, and the disordered limb first well rubbed with a cloth dipped in some warm discutient fomentation, before any fresh cataplasm be laid on. Of the cooling external medicines proper in this case, are the litharge vinegar, applied warm on linnen rags folded together; or hot vinegar mixt with red-lead, or with bole-armoniack, and applied in the same manner. Among the hot remedies for cold constitutions, are spirit of wine alone; or camphorated spirit; or either of these, with an admixture of a small quantity of venice-treacle applied on a linnen cloth; also spirit of wine mixed with lime-water, or even lime-water alone; or hungary-water with lapis calaminaris, cerus, sal armoniac; or a mixture of a pint of rectified spirit of wine with two ounces of castile soap.

**DISPLAYED**, in heraldry, is understood of the position of an eagle, or any other bird, when it is erect, with its wings expanded or spread forth. See plate LXXIII. fig. 5.

**DISPONDEE**, *dispondeus*, in the greek and latin poetry, a double spondee or foot, consisting of four long syllables, as *θάρμαζόντων*, *mæcênâtes*, *conclûdêntes*.

**DISPOSITION**, in architecture, the just placing the several parts of an edifice, according to their proper nature and office. See the article **BUILDING**.

**DISPOSITION**, in rhetoric, the placing words in such an order as contributes most to the beauty and sometimes even to the strength of a discourse.

Nature formed man with a taste which makes him sensible of harmony and cadence: for this we need only consult nature, study the genius of the language and sound, and, as it were, interrogate our ears: for let a thought be ever so beautiful in itself, if the words which express it are ill placed, the delicacy of the ear is shocked at it; a harsh and unharmonious composition grates it, whereas it is generally flattered with that which is soft and flowing. There are no expressions, however harsh they may appear in themselves, but may contribute to the harmony of a discourse, when judiciously ranged. Isocrates was the first among the Greeks that made them sensible of the beauty of disposition, as Cicero did the Romans.

**DISPRO-**

**DISPROPORTION**, a general term for any kind of irregularity, or want of proportion in the parts of a thing. See the article **PROPORTION**.

**DISPROVING**, in rhetoric and logic, the same with refutation. See the article **REFUTATION**.

**DISPUTATION**, in the schools, a contest, either by word or writing, on some point of learning for a degree, prize, or for an exercise. See **DEGREE** and **THESIS**.

**DISQUISITION**, a serious and exact examination into the circumstances of any affair, in order to discourse clearly about it. See **REASONING**.

**DISS**, a market-town of Norfolk, on the river Waveny, sixteen miles south of Norwich.

**DISSECTION**, in anatomy, the cutting up a body, with a view of examining the structure and use of the parts. See the article **ANATOMY**.

Le Gendre observes, that the dissection of a human body, even dead, was held a sacrilege till the time of Francis I. and the same author assures us, he has seen a consultation held by the divines of Salamanca, at the request of Charles V. to settle the question whether or no it were lawful in point of conscience to dissect a human body in order to learn the structure thereof.

It is easily perceived that surgery and physic must improve in a country, according to the opportunities of enquiring into the structure of the animal oecconomy; for which reason we could wish that students in anatomy were furnished with subjects for dissection in this country, in as great abundance, and with as little inconvenience, as in France.

**DISSEISIN**, in law, an unlawful dispossessing a person of his lands or tenements. It is of two sorts, either single disseisin, which is committed without force of arms, or disseisin by force of arms, more properly termed forcement. See the article **DEFORCEMENT**.

The disturbing a person from entering on his land, or hindring him from tilling it, are both disseisins of land; and denial of rent, when lawfully demanded, is a disseisin of the rent.

If a disseisor, after he has expelled the right owner, gains peaceable possession of the lands five years without claim, and continues in possession so as to die seised, and the land descends to his heirs, they will have a right to the possession

till the owner recovers at law; and here the owner shall lose his estate for ever, if he do not prosecute his suit within the time limited by the statute of limitations.

**DISSEISOR**, a person who is guilty of disseisin. See the preceding article.

**DISSENTIERS**, separatists from the service and worship of the church of England.

At the revolution a law was enacted, that the statutes of queen Elizabeth and king James I. concerning the discipline of the church, should not extend to the protestant dissenters. Persons dissenting, however, are to subscribe the declaration of 30 Car. II. cap. 1. and take the oaths of fidelity, &c. Besides, they are not to hold their meetings till their place of worship is certified to the bishop, or to the justices of the quarter sessions, and registered. Also they are not to keep the doors of their meeting-houses locked during the time of divine service. And to secure to them the free exercise of their religion, whoever disturbs or molests them in the performance of divine worship, on conviction at the sessions is to forfeit twenty pounds by the statute 1 William and Mary. Unless dissenters conform and receive the sacrament as administered by the church of England, they are excluded from holding any public places under the government.

The dissenters tolerated by law, may be reduced to four classes, *viz.* presbyterians, independants, anabaptists, and quakers; to which may be added another sect, which some years ago obtained a toleration in this country, namely, the unitas fratrum, or moravians. See the articles **PRESBYTERIANS**, **ANABAPTISTS**, &c.

**DISSIMILAR**, in general, an appellation given to things which are unlike: thus the seminal or first leaves of plants, are called dissimilar, as being generally of a different figure from those of the grown plants.

**DISSIMILAR PARTS**, in anatomy, those compounded of parts of various structure, such are all the limbs of the body.

**DISSIMILITUDE**, in general, denotes whatever constitutes the difference between two dissimilar things. See the articles **DISSIMILAR** and **SIMILITUDE**.

**DISSIMILITUDE**, in rhetoric, an argument wherein from dissimilar or unlike things, other dissimilars are deduced, as in the following argument from Catulla.

*Soles occidere & redire possunt.*

*Nobis cum semel occidit brevis lux,*

*Nox est perpetua una dormienda.*

*Voss. de institut. orator.*

**DISSIPATION**, in physics, an insensible loss or consumption of the minute parts of the body; or, that flux whereby they fly off, and are lost. See **EFFLUVIA**.

**Circle of DISSIPATION**, in optics, is used for that circular space upon the retina, which is taken up by one of the extreme pencils or rays issuing from an object.

To understand this, it is to be observed, that when the distance of an object from the eye is too small or too great for perfect or distinct vision, the rays of each pencil, issuing from the object, cannot be united at a point on the retina, but beyond it, or before they arrive at the retina; consequently, the rays of each pencil will occupy a circular space upon the retina, and this circle is called the circle of dissipation, because the rays of a pencil, instead of being collected into a central point, are dissipated all over this circle.

The consideration of the circles of dissipation, formed by the rays coming from the extremities of objects, is of use to account for several curious phenomena of vision. *Smith's optics.*

**DISSOLVENT**, in general, whatever dissolves or reduces a solid body into such minute parts as to be sustained in a fluid.

The principal dissolvents for metals, are aqua-regia and aqua-fortis; for salts, earths, and gums, water; for coral, and other alkaline substances, distilled vinegar or spirits of wine. See the article **AQUA-REGIA**, &c.

Dissolvents are the same with what the chemists call menstrua. See the article **MENSTRUUM**.

**Universal DISSOLVENT**. See the article **ALKAHEST**.

**DISSOLUTION**, in chemistry, the same with solution. See the articles **SOLUTION** and **MENSTRUUM**.

**DISSOLUTION**, in music, is when a sound in the enharmonic genus is lowered three dièses; for thereby that genus is dissolved, and the music, or that interval at least, is chromatic.

**DISSONANCE**, in music, the same with discord. See the article **DISCORD**.

**DISSYLLABLE**, among grammarians, a word consisting only of two syllables; such are nature, science, &c.

**DISTAFF**, an instrument about which flax is tied in order to be spun.

**DISTANCE**, in general, an interval between two things, either with regard to time or place.

**Accessible DISTANCES**, in geometry, are such as may be measured by the chain, &c. See **CHAIN**, **THEODOLITE**, &c.

**Inaccessible DISTANCES**, are such as cannot be measured by the chain, &c. by reason of some river, or the like, which obstructs our passing from one object to another. Inaccessible distances may be measured in the following manner: suppose it were required to measure the distance between the station A (plate LXXIII. fig. 6. n° 1.) and the object at C. Assume another station as B, from whence the object may be seen. Then, with any proper instrument, take the angles CAB, and CBA, and measure the distance AB. Then, in the triangle ABC are given three angles, and the distance AB, whence the distance AC required may be easily found, thus: as the sine of the angle C: the distance AB :: the sine of the angle B: AC required.

But small inaccessible distances may be measured from one station, in the following manner. Let AB (*ibid.* n° 2.) represent an inaccessible distance to be measured; set up perpendicular a stick CA, of a known length, place the center of your quadrant C, on the top of the stick; and look through the sights of it till the visual ray points to the object at B. Then in the right angled triangle BAC, are given the perpendicular AC, and the angle ACB, and therefore, if AC be supposed the radius, the required side will be the tangent to the given angle ACB; whence to find AB it will be as the radius to AC, so is the tangent of the angle ACB, to AB required.

**DISTANCE**, in navigation, the number of minutes or leagues a ship has sailed from any given place or point.

**DISTANCE**, in astronomy. The distance of the sun, planets, and comets, is only found from their parallax, as it cannot be found either by eclipses or their different phases: for from the theory of the motions of the earth and planets we know, at any time, the proportion of the distances of the sun and planets from us; and the horizontal parallaxes are in a reciprocal proportion to these distances. See the article **PARALLAX**.

The mean distances of the planets from the sun, in british miles, are as follow.

Mercury	32,000,000	} miles distant from the sun.
Venus	59,000,000	
The Earth	81,000,000	
Mars	123,000,000	
Jupiter	424,000,000	
Saturn	777,000,000	

The distance of the fixed stars, as having no sensible parallax, can be little more than guessed at.

The distances of the secondary planets, from their respective primary ones, are as follow.

The moon is distant from the earth 60 semi-diameters and a half of the earth, from its center, or 240,000 miles.

The first moon of jupiter is at the distance of  $5\frac{1}{10}$  semi-diameters of jupiter's body from his center, as measured with a micrometer.

The second at the distance of 9 semi-diameters.

The third at the distance of  $14\frac{3}{10}$  semi-diameters.

The fourth at the distance of  $25\frac{1}{10}$  semi-diameters.

The first saturnian moon is at the distance of near 2 semidiameters of saturn's ring from its center.

The second at the distance of  $2\frac{2}{3}$  semi-diameters of the ring.

The third at the distance of  $3\frac{2}{3}$  semi-diameters.

The fourth at the distance of 8 semi-diameters.

The fifth at the distance of  $23\frac{7}{10}$  semi-diameters. See DIAMETER.

**Curtate DISTANCE**, the distance of the planet's place, reduced to the ecliptic, from the sun. See the article CURTATE.

**DISTANCE of the eye**, in perspective, is a line drawn from the eye to the principal point. See PERSPECTIVE.

**DISTANCE of the bastions**, in fortification, is the side of the exterior polygon. See the article POLYGON.

**DITASTE** properly signifies an aversion or dislike to certain foods, and may be either constitutional, or owing to some disorder of the stomach; in which last case emetics are recommended.

**DISTEMPER**, among physicians, the same with disease. See the article DISEASE.

**DISTEMPER**, in painting, a term used for the working up of colours with something besides water or oil. If the colours are prepared with water, that kind of painting is called limning; and if with oil, it

is called painting in oil, and simply painting. If the colours are mixed with size, whites of eggs, or any such proper glutinous, or unctuous matter, and not with oil, then they say it is done in distemper. In this manner the admirable cartoons at Hampton-court are painted. The greatest disadvantage of distemper is, that it has no glittering, and all its colours look dead, by which means they appear alike in all sorts of lights, which oil colours, or even colours in distemper, when varnished, do not.

**DISTEMPER**, or **DISTEMPER** of trees. See the article TREE.

**DISTENSION**, in general, signifies the stretching or extending a thing to its full length or breadth.

**DISTENSION**, *distensio*, among antient musicians, is used in a synonymous sense with Interval. See INTERVAL.

**DISTICH**, *distichon*, a couplet of verses making a complete sense. Thus hexameter and pentameter verses are disposed in distichs.

There are excellent morals in Cato's Distichs.

**DISTICHIASIS**, in surgery, a disease of the eye-lids, when under the ordinary eye-lashes there grows another extraordinary row of hair, which frequently eradicates the former, and pricking the membrane of the eye, excites pain, and brings on a defluxion.

It is cured by pulling out the second row of hairs with nippers, and cauterizing the pores out of which they issued.

**DISTILLATION**, in chemistry, the act of drawing off the spirituous, aqueous, oleaginous, or saline parts of a mixed body from the grosser and more terrestrial parts by means of fire, and collecting and condensing them again by cold. The end of distillation is of two kinds: the first, and by far the most general, is for the separation of some acquired bodies, from others with which they were mixed, as in the case of vinous and volatile spirits, and essential oils: the other is for the quicker and more effectual combination of such bodies, whose mixture is assisted by a boiling heat, as in the case of spirit. nitr. dulc.

Distillation is performed by several kinds of apparatus, for all which the general name is an alembic; to form each kind whereof, two or more vessels are conjoined, viz. a proper reservoir to contain the matter while the heat acts upon it, a refrigerant to condense the vapour as it

rises, and a receiver to contain it when condensed. See ALEMBIC, RETORT, and RECEIVER.

Distillation is usually performed by means of fire, raised to a greater or less degree of heat, as circumstances require. And the fire is either applied immediately to the vessels in which the matters are to be distilled; or it is applied mediately by means of water, sand, iron-filings, &c. Hence these different methods are called *balneum marie*, *balneum arenorum*, &c. See the article BALNEUM.

Distillation is either *per ascensum*, by ascent, or *per descensum*, by descent. In the former, the matter to be distilled is above the fire, and the spirit or other principle is raised from it. In the latter, the matter to be distilled is below the fire, and the vapour drawn from it is precipitated to the bottom of the vessel.

Distillation by ascent is either right, performed with a common alembic, wherein the liquor is raised perpendicularly, and descends again in form of drops into a receiver, being chiefly used when the texture of the body allows of an easy ascent, as in vegetables; or oblique, performed laterally, as in distillation by the retort; the use of this is for bodies, as almost all minerals and metals, which cannot be raised without a strong impulse, nor even by the strongest, so high as the top of the alembic.

The process and measures of distillation are very different, according to the different subjects to be distilled. Acid spirits are usually drawn in a reverberatory furnace, and with a vehement fire: ponderous woods, as guaiacum, box, &c. are distilled in a retort after the same manner. Odoriferous plants, as baum, wormwood, sage, hyssop, &c. are distilled by the cucurbit, or vesica, first pouring a strong decoction of the same plant hot upon the plant itself bruised, or adding common water to the plant, whether dry or fresh, cut into small pieces, and letting the whole digest in a close vessel for two days. In distilling plants that are not odoriferous, pound the plant, and then fill two thirds of the vesica or alembic with it; after which pour a good quantity of the expressed juice of the same plant upon it, so as the bruised matter may float therein, without sticking any where to the vessel; then draw off about half as much water as there was juice, which is the distilled water of the plant: if what remains be passed in a cloth, and the settled juice

be filtrated and evaporated to two thirds, then setting it in a cool place, the essential salt shoots into crystals.

The precautions to be used in regard to distillation, are, 1. To leave sufficient room in the containing vessel for the expansion and ebullition of the matter to be distilled, otherwise it is very apt to overflow in the neck, and break the vessels if of glass, hazard the firing of the building in case of vinous spirits, and frustrate the operation in all. 2. To take care that the condensing surface be sufficiently large, and the heat accommodated to it; for if an error of this kind occur in the case of the worm-still, the head will be blown off, and the vapour dissipated with considerable loss; and in that of vinous spirits, whoever may happen to be in the place will be in very great danger. 3. It is necessary in distillation, as well as in digestion, to avoid luting the vessels too closely with any tenacious substance; for if a sufficient vent be not left for the escape of the air which is generated during the distillation of some substances, as also for the expansion which attends the increase of heat of that air which is included in the vessels at the time of their junction, the vessels will be in extreme danger of being burst with great violence.

*The method of distilling malt-wash, or a fermented mixture of meal and malt, for spirit.* Fill two thirds of a still, first moistened by the steam of boiling water, with malt-wash, immediately clap on the head, and lute it down, there will soon run a spirituous inflammable liquor. Thus is obtained what the malt-distillers call a malt low-wine; what comes over after the spirit falls off from being proof, is called faints. This experiment may be rendered general, with slight variation; for if any wine, beer, or fermented liquor from sugar, treacle, or fruits, &c. be thus treated, it affords a spirit differing only according to the nature of the subject: but none of them will afford the least inflammable spirit without a previous fermentation. The requisite cautions for success, are, 1. That the fermentation be well performed. 2. That it be gently distilled, with a soft well regulated fire. 3. That the grosser oil, apt to rise along with the spirit, be let out by flannel under the nose of the worm. These cautions observed, the low-wines will be pure and vinous.

*The method of distilling the lower wines into proof spirits for sale.* The lower wines of



of the last process, distilled in a bath-heat, give a higher rectified spirit than before, which being let down with fair water to a certain size or standard, called proof, is what the malt-distillers understand by proof-goods, or their rectified malt-spirit.

The inconveniencies of this art, on account of the many large vessels required, which increase the labour and price of the commodity, might perhaps be remedied by the introduction of a new art, subservient to the malt-distillers, and confined to the boiling down the malt-wort to a rob; wherefore it were to be wished that those who were skilled in this branch of distillation would try whether a spirit superior to that of treacle may not be procured from the rob of malt, prudently prepared and fermented. See the article RECTIFICATION.

*Combinatory DISTILLATION*, a term used by Dr. Shaw, to express that sort of rectification of distilled spirits, which is done with additions, and which he otherwise calls *improper rectification*, by way of distinction from that called proper rectification which is only the method of reducing a spirit to its utmost degree of purity and perfection. Malt-spirit is the general subject of combinatory distillation, and the means to rectify it on this plan may be reduced to three heads: 1. That by fixed alkaline salts alone. 2. That by fixed alkaline salts and acid spirits. And, 3. That by saline bodies and flavouring additions. The effect of this operation, when carefully performed, is to attenuate and thin the spirit, and to keep back a part of its gross and fetid oil, and so far to alter the part of the oil which comes over, as scarce to leave the spirit distinguishable from a malt spirit.

The salts used on this occasion are either the fixed alkalies, as potash and calcined tartar, or decrepitated common salt, or calcined vitriol, alum, or sandiver. The most common flavourers are mace, orris-root, parsnips, artichokes, rhodium, raisin-stalks, damask roses, wine lees, rape or grape husks, and the oil of wine, which is infinitely preferable to all the others, but is not so well known. The ultimate perfection aimed at in all the processes of combinatory distillation, is the depurating the english malt-spirit at one operation, so as to render it tasteless and inodorous and yet vinous; or else to make it resemble the french brandy, arrack, or some other low-flavoured vinous spirits.

**DISTILLED**, something that has undergone the action of distillation: thus we say distilled water, distilled vinegar, &c. See the preceding article.

**DISTILLER**, he who makes distillations, and commonly denotes a tradesman who makes spirits from malt, &c.

Distillers are to make an entry of all warehouses for keeping brandy, on pain of 20 l. and forfeiture of the liquor; and no brandy shall be sold but in places entered, under penalty of 40 s. a gallon.

By stat. 24 Geo. II. distillers who shall knowingly sell spirituous liquors to be unlawfully retailed, or to any unlicensed retailer, forfeit 10 l. and treble the value of the liquors so sold and delivered; and such unlawful retailer, discovering and convicting the distiller, is intitled to his share of the penalty, and indemnified against the penalties incurred by himself. The same act further provides, that no person whatsoever shall recover, either in law or equity, any debt for spirituous liquors under 20 s. contracted at one time; nor shall any item in any account for such be allowed, where the value of such item shall not amount to 20 s. at the least. Distillers are also to give notice to the gauger, before they receive any fermented wash, of the quantity, &c. under penalty of 50 l. They are also to make entry of all vessels for distillation, under the same penalty of 50 l. and forfeit 20 l. for defacing the gauger's mark.

**DISTILLERY**, the art of distilling brandies, and other spirits. See the article DISTILLATION.

To this art likewise belong the peculiar processes of brewing and fermentation, the knowledge of proper additions, and the rectification of spirits. See the articles BREWING, FERMENTATION, ADDITIONS, and RECTIFICATION.

**DISTINCT NOTION**, or **IDEA**, is that wherein the mind perceives a difference from all other ideas.

It will be useful, says Mr. Locke, to distinguish ideas as they are perceptions in our minds, from what they are in the bodies that cause such perceptions in us; for we are not to think the former exact images and resemblances of something inherent in the subject, most of those of sensation being in the mind no more the likeness of something existing without us, than the names that stand for them are the likeness of our ideas, which yet upon hearing they are apt to excite in us.

**DISTINCT BASE**, in optics, is that distance from

from the pole of a convex glass, in which objects beheld through it appear distinct and well described, so that it is the same with the focus. See FOCUS.

The distinct base is caused by the collection of the rays that proceed from a single point in the object into a single point in the representation; and therefore concave glasses which dissipate the rays, can have no real distinct base.

**DISTINCTION**, in logic, is an assemblage of two or more words, whereby disparate things, or their conceptions, are denoted. There are three kinds of distinctions taken from the three different modes of existence, real, modal, and rational. The first is that between two substances, or the modes of two substances. The second, or modal distinction, is that between several things, one whereof may exist without the other, but not *vice versa*, the other without that. The third, or rational distinction, is that between several things which are really one and the same, and whereof one cannot exist without the other; nor *vice versa*, the other without this: such is that between a thing and its essence, between the essences and properties, &c. Of this distinction some authors admit two kinds, the one barbarously called *rationis ratiocinata*, having some foundation in things, as when we distinguish the justice of God from his mercy; the other called *rationis ratiocinantis*, which has no foundation at all, and therefore is by many rejected. *Chauvin.*

**Metaphysical DISTINCTION** is the non-agreement of being, whereby this entity is not that, or one thing is not another. See ESSENCE.

**DISTINCTION**, *distinctio*, or *distinguo*, is also used, in the schools, as an expedient to evade an argument, or to clear up and unfold an ambiguous proposition, which may be true in one sense, and false in another: as we say, The respondent was hard pressed, but he disengaged himself by a *distinguo*. *Trevoux.*

**DISTORTION**, in medicine, a contraction of one side of the mouth, occasioned by a convulsion of the muscles of one side of the face: and it is likewise used to denote any part of an animal body, when it is ill placed or ill favoured. It is very justly observed, that this terrible malady to the human shape has often been the mere effect of carelessness and ill habits.

**DISTORTOR ORIS**, in anatomy, a muscle otherwise called *zygomaticus*. See the article ZYGOMATICUS.

**DISTRACTION**, *distractio*, in chemistry, a forcible division of substances from each other, which were before united, either by separation or calcination.

**DISTRACTION**, in medicine, sometimes denotes the act of pulling a fibre, membrane, or the like, beyond its natural extent.

**DISTRAINING**, in law, the same with attaching. See the article ATTACHING.

**DISTRESS**, in law, the seizing or distraining any thing for rent in arrear, or other duty unperformed.

The effect of this distress is to compel the party either to replevy the things distrained, and contest the taking, in an action of trespass against the distrainer; or rather to oblige him to compound and pay the debt or duty, for which he was so distrained.

There are likewise compulsory distresses in actions, to cause a person appear in court; of which kind there is a distress personal of one's moveable goods, and the profits of his lands, for contempt in not appearing after summons: there is likewise distress real, of a person's immoveable goods. In these cases none shall be distrained to answer for any thing touching their freeholds, but by the king's writ.

Distress may be either finite or infinite: Finite distress is that which is limited by law, in regard to the number of times it shall be made, in order to bring the party to a trial of the action. Infinite distress is that which is without any limitation, being made till the person appears: it is farther applied to jurors that do not appear, as upon a certificate of assize, the process is *venire facias*, *habeas corpus*, and distress infinite.

It is also divided into grand distress and ordinary distress: of these the former extends to all the goods and chattels that the party has within the county. A person, of common right, may distrain for rents and all manner of services; and where a rent is reserved on a gift in tail, lease for life, or years, &c. though there be no clause of distress in the grant or lease, so as that he has the reversion: but on a feoffment made in fee, a distress may not be taken, unless it be expressly reserved in the deed.

**DISTRIBUTION**, in a general sense, the act of dividing a thing into several parts, in order to the disposing each in its proper place.

**DISTRIBUTION**, in architecture, the dividing and dispensing the several parts and pieces which compose a building, as the plan directs. Dis-

**DISTRIBUTION** of ornaments, is an equal orderly placing of the ornaments in any member of architecture.

**DISTRIBUTION**, in logic, is a kind of division which distinguishes an universal whole into its several kinds of species; as division is to distinguish an integral whole into its several parts.

The rules of a good distribution are much the same as those of division. See the article **DIVISION**.

**DISTRIBUTION**, in rhetoric, a kind of description, whereby an orderly division and enumeration is made of the principal qualities of the subject. David supplies us with an example of this kind, when in the heat of his indignation against sinners, he gives a description of their iniquity, " Their throat is an open sepulchre; they flatter with their tongues; the poison of asps is under their lips; their mouth is full of cursing and lies; and their feet are swift to shed blood."

**DISTRIBUTION**, in printing, the taking a form asunder, separating the letters, and disposing them in the cases again, each in its proper cell. See **PRINTING**.

**DISTRIBUTIVE JUSTICE**, is that whereby we give every person what properly belongs to him.

**DISTRIBUTIVES**, in grammar. See the article **NUMERALS**.

**DISTRICT**, in geography, a part of a province, distinguished by peculiar magistrates, or certain privileges; in which sense it is synonymous with hundred. See the article **HUNDRED**.

It is also used to denote the territory belonging to a city, town, or borough; or the extent of a judge's jurisdiction. See **TERRITORY** and **JURISDICTION**.

**DISTRINGAS**, in law, a writ commanding the sheriff, or other officer, that he distrain a person for debt to the king, &c. or for his appearance at a certain day. There is a great diversity of this writ.

**DISTRINGAS JURATORES**, a writ directed to the sheriff, whereby he is commanded to distrain upon a jury, to appear, and to return issues on their lands, &c. for non appearance. This writ of distringas juratores issues for the sheriff to have their bodies in court, &c. at the return of the writ.

**DISVELLOPED**, in heraldry, is used much in the same sense with displayed, as flying colours are said to be disvelloped.

**DISUNITE**, in the manege, is said of a horse that drags his haunches in galloping.

**DITCH**, in country-affairs, a narrow channel or trench made for draining marshy grounds, the conveyance of water, or inclosing fields.

Ditches for draining must be more or less deep and wide, according as there is more or less water to be carried off. Ditches used about inclosures are five or six feet wide, and proportionably deep, where there is no quick-set hedges; but where these are set on the banks, they are only three feet wide at the top, one at the bottom, and two deep: the slope is of great advantage, as by means of it the sides of the ditch are prevented from being washed down. See **DRAIN** and **INCLOSURE**.

**DITCH**, in fortification, the same with moat. See the article **MOAT**.

**DITHYRAMBIC**, something belonging to the dithyrambus, as a dithyrambic verse, a dithyrambic poet, &c. See the next article.

The dithyrambic poetry was very bold and irregular, for the poets not only took the liberty to forge new words for the purpose, but made double and compound words, which contributed very much to the magnificence of this sort of poetry.

**DITHYRAMBUS**, in ancient poetry, a hymn in honour of Bacchus, full of transport and poetical rage.

This poetry owes its birth to Greece, and to the transports of wine; and yet art is not quite exploded, but delicately applied to guide and restrain the dithyrambic impetuosity, which is indulged only in pleasing flights. Horace and Aristotle tell us, that the ancients gave the name of dithyrambus to those verses wherein none of the common rules or measures were observed. As we have now no remains of the dithyrambus of the ancients, we cannot say exactly what their measure was.

**DITMARSH**, a territory in the dutchy of Holstein. See **HOLSTEIN**.

**DITONE**, in music, an interval comprehending two tones. The proportion of the sounds that form the ditone is 4:5, and that of the semiditone is 5:6. F. Parra makes the ditone the fourth kind of simple concord, as comprehending two tones, according to Aristotle, a greater and a less. Others make it the first discord, dividing the ditone into eighteen equal parts, or commas; the nine on the acute side making the greater tone, as asserted by Salmon de Caux.

**DITRIGLIPH**, in architecture, the space between two triglyphs. See **TRIGLYPH**.

**DITRIHEDRIA**,

**DITRIHEDRIA**, in mineralogy, a genus of spars with twice three sides, or six planes, being formed of two trigonal pyramids joined base to base, without any intermediate column. See SPAR.

The species of ditrihedria are distinguished by the different figures of these pyramids.

**DITTANY**, *distamnus*, in botany, &c. See the article **DICTAMNUS**.

**DITTO**, usually written **D°**, in books of accounts, an Italian word, signifying *the aforementioned*.

**DIVAL**, in heraldry, the herb nightshade, used by such as blazon by flowers and herbs, instead of colours and metals, for sable, or black.

**DIVALE**, in botany, a name sometimes used for the solanum lethale, or deadly nightshade. See **SOLANUM**.

**DIVALIA**, the same with angeronalia. See the article **ANGERONALIA**.

This feast was instituted on occasion of a disease which destroyed man and beast. It was held on December 21. when the pontiffs performed sacrifice in the temple of Volupia, or the goddess of joy and pleasure, and was the same with Angerona, supposed to drive away all sorrows and chagrins in life.

**DIU**, a little island and town on the coast of Guzurat, in the hither India, and subject to Portugal: east long. 69°, north lat. 21° 15'.

**DIU** is also a town of Bulgaria, upon the Danube.

**DIVAN**, a council chamber, or court of justice, among the eastern nations, particularly the Turks.

**DIVAN-BEGHI**, the superintendant of justice in Persia, whose place is the last of the six ministers of the second rank, who are all under the athemadauler, or first minister. To this tribunal of the divan-beghi he appeals from sentences passed by the governors: he has a fixed stipend of 50,000 crowns for administering justice. All the serjeants, ushers, &c. of the court, are in his service: he takes cognizance of the criminal causes of the chams, governors, and other great lords of Persia, when accused of any fault. There are divan-beghi's not only at court, and in the capital, but also in the provinces, and other cities of the empire. The alcoran is the sole rule of his administration of justice, which also he interprets at pleasure. He takes no cognizance of civil causes, but all differences arising between the officers of the king's

household, and between foreign ministers, are determined by him.

**DIVANDUROW**, the name of seven islands which lie a league north of the Maldives, and twenty-four from the coast of Malabar, almost opposite to Cananor.

**DIVAR**, an island in the Indian sea, situated north of Goa. It belongs to the Portuguese.

**DIVER**, *colymbus*, in ornithology, the English name of a genus of birds, for the characters of which see **COLYMBUS**. Of this genus there are a great many beautiful species. The speckled diver, about the bigness of a tame duck, is represented in plate LXXIV. fig. 1. n° 1. The hinder part of the neck is of an ash colour; the back and wings are black, spotted with white; the throat is black, and belly white. This is thought to be the cock of the red-throated duck, or loon, represented *ibid.* n° 2. The upper part of the body of this last is of a dark grey colour, the quill feathers of the wings approaching to black: the legs and feet of both are of a blackish colour.

**DIVERGENT**, or **DIVERGING LINES**, in geometry, are those which constantly recede from each other.

**DIVERGENT RAYS**, in optics, are those which going from a point of the visible object, are dispersed, and continually depart one from another, in proportion as they are removed from the object: in which sense it is opposed to convergent. See the article **CONVERGENT**.

Concave glasses render the rays divergent, and convex ones convergent.

Concave mirrors make the rays converge, and convex ones make them diverge. See **CONCAVE** and **CONVEX**.

**DIVERGENT**, or **DIVERGING HYPERBOLA**, one whose legs turn their convexities towards one another, and run outwards quite contrary ways. See **HYPERBOLA**.

**DIVERGING SERIES**. See **SERIES**.

**Point of DIVERGENCY**. See the article **VIRTUAL FOCUS**.

**DIVERSIFYING**, among orators, is the handling a subject different ways, in order to throw new light on it, and enforce it the stronger on the hearers.

According to Vossius, there are six ways of doing this: 1. By enlarging on what was said before. 2. By recapitulating. 3. By adding something new. 4. By repeating the principal heads. 5. By urging the same arguments, only in a different order. 6. By imitating them.

**DIVER-**

DIVERS.



T. Jefferys sculp.



**DIVERSION**, in military affairs, is, when an enemy is attacked in one place where they are weak and unprovided, in order to draw off their forces from another place, where they have made, or intend to make, an irruption. Thus the Romans had no other way in their power of driving Hannibal out of Italy, but by making a diversion, in attacking Carthage.

**DIVERSION**, in physic, is when by means of medicines, an attempt is made to give a different turn to the flux of humours: thus blood-letting makes a great diversion.

**DIVERSITY**, in logic, stands in opposition to identity. See **IDENTITY**.

**DIVERSITY**, in painting, consists in giving every part or figure in a piece, its proper air and attitude.

The skilful painter has the penetration to discern the character of nature, which varies in all men. whence the countenances and gestures of the persons he paints continually vary.

**DIVESTING**, or **DIVESTITURE**, in law, is used for the act of surrendering one's effects. By a contract of donation, or sale, the donor, or seller, is said to be disseised and divested of his property, in such a commodity. In this sense it stands contradistinguished from investiture, where the donee or purchaser becomes invested with the property of the donor or seller. See the articles **INVESTITURE** and **DISSEISIN**.

**DIVIDEND**, in arithmetic, the number proposed to be divided into equal parts. It must always be greater than the divisor. See the articles **DIVISOR** and **DIVISION**.

**DIVIDEND**, in the Exchequer, is one part of an indenture, as used in the stat. 10 Ed. I. c. 11.

**DIVIDEND**, in law proceedings, is taken for a dividing of fees and perquisites between officers of courts, arising from writs, &c.

**DIVIDEND of Stocks**, is a share, or proportion of the interest of stocks erected on public funds, as the south-sea, &c. divided among, and paid to the adventurers half yearly.

Stealing of any dividend warrants of the Bank, South-sea company, East-india company, or of any other corporation, is made felony with or without benefit of clergy, in the same manner as if the offender had stolen, or taken by robbery, goods to the value of the

money due on such dividend warrants. Stat. 2 Geo. II. c. 25. S. 3.

**DIVIDEND**, in the university, signifies that part or share which every one of the fellows equally divide among themselves of their yearly stipend. See the articles **FELLOW** and **UNIVERSITY**.

**DIVINATION**, the knowledge of things obscure, or future, which cannot be attained by any natural means.

It was a received opinion among the heathens, that the Gods were wont to converse familiarly with some men, whom they endowed with extraordinary powers, and admitted to the knowledge of their councils and designs. Plato, Aristotle, Plutarch, Cicero, and others, divide divination into two sorts, or species, *viz.* natural and artificial. The former was so called, because not attained by any rules or precepts of art, but infused or inspired into the diviner without his taking any further care about it, than to purify and prepare himself for the reception of the divine afflatus. Of this kind were all those who delivered oracles, and foretold future events by inspiration, without observing external signs or accidents. The second species of divination was called artificial, because it was not obtained by immediate inspiration, but was the effect of experience and observation. Such was soothsaying, as depending upon human art and invention, which however was supposed not to be altogether destitute of divine direction and concurrence, and such was divination by lots. Of this sort there were various kinds, as by sacrifices, entrails, flame, cakes, flour, wine, water, augury, birds, lots, verses, omens, &c. The several sorts of divination are alectryomancy, alphetomancy, arithmomancy, axinomancy, bellomancy, catoptromancy, ceromancy, chiromancy, cledomancy, dactylomancy, galtramancy, geomancy, hydromancy, lithomancy, necromancy, oneirocritica, &c. See the article **ALECTRYOMANCY**, &c.

**DIVINE**, something relating to God. See the article **GOD**.

**DIVINE STONE**, in natural history, a species of the jasper. See **JASPER**. The indians attribute great medicinal virtues to this stone: they wear it externally as a cure for the gravel; they say it promotes urine extremely, and seldom fails to bring away large quantities of gravel with it, when there has

been any lodged in the passages; they wear it also by way of amulet, to preserve them from the bites of venomous animals, and tie it to the part bitten, by way of cure.

**DIVING**, the art of descending under water, to considerable depths, and abiding there a competent time; the uses of which are considerable, particularly in fishing for pearls, corals, sponges, wrecks of ships, &c.

There have been various engines contrived to render the business of diving safe and easy; the great point is to furnish the diver with fresh air, without which he must either make but a short stay, or perish. Those who dive for sponges in the Mediterranean, carry down sponges dipt in oil in their mouths, but considering the small quantity of air that can be contained in the pores of a sponge, and how much that little will be contracted by the pressure of the incumbent air, such a supply cannot subsist a diver long, since a gallon of air is not fit for respiration above a minute. See the next article.

**DIVING-BELL**, a machine contrived for the safe conveyance of a diver to any reasonable depth, and whereby he may stay more or less time under water, as the bell is greater or less.

That the reader may have a just idea of the diving-bell, according to the latest improvements by Dr. Halley, and Mr. Triewald of Stockholm, we have here exhibited two figures of the same. The first (plate LXXV. fig. 1. n<sup>o</sup> 1.) is that of Dr. Halley's form, which was three feet wide at top, five at bottom, and eight feet high, and contained about sixty-three cubic feet, or near eight hogheads in its concavity.

This was coated with lead, so heavy, that it would sink empty, and the weight was distributed about the bottom I K, so that it would go down in a perpendicular position, and no other. In the top was fixed a strong but clear glass D, to let in the light from above; and likewise a cock, as at B, to let out the hot air that had been breathed; and below, was fixed a circular seat, L M, for the divers to sit on; and lastly, from the bottom was hung, by three ropes, a stage for the divers to stand on, to do their business. This machine was suspended from the mast of a ship by a sprit, which was sufficiently secured by stays to the mast-head, and was directed by

braces to carry it over-board, clear of the side of the ship, and to bring it in again.

To supply the bell with air under water, two barrels, such as C, of about sixty-three gallons each, were made, and cased with lead, so that they might sink empty, each having a hole in its lowest part, to let in the water, as the air in them is condensed in their descent, and to let it out again when they were drawn up full from below. And to a hole in the top of the barrel was fixed a hose, or hollow pipe, well prepared with bees-wax and oil, which was long enough to fall below the hole at the bottom, being sunk with a weight appended, so that the air in the upper part of the barrels could not escape, unless the lower end of these pipes were first lifted up.

These air barrels were fitted with tackle proper to make them rise and fall alternately, like two buckets in a well. In their descent, they were directed by lines fastened at the under edge of the bell to the man standing on the stage to receive them, who, by taking up the ends of the pipes above the surface of the water in the bell, gave occasion for the water in the barrels to force all the air in the upper parts into the bell, while it entered below, and filled the barrels; and as soon as one was discharged by a signal given, it was drawn up, and the other descended to be ready for use.

As the cold air rushed into the bell from the barrel below, it expelled the hot air (which was lighter) through the cock B, at the top of the bell, which was then opened for that purpose. By this method air is communicated so quick, and in such plenty, that the doctor tells us, he himself was one of the five who was at the bottom in nine or ten fathom water, for above an hour and a half at a time, without any sort of ill consequence; and he might continue there so long as he pleased, for any thing that appeared to the contrary.

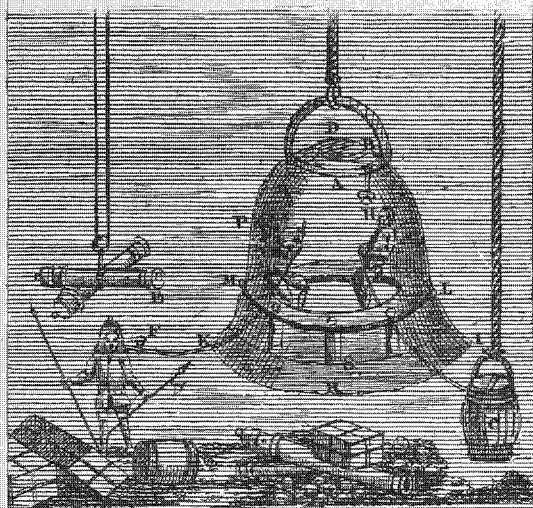
In going down, it is necessary it should be very gentle at first, that the dense air may be inspired to keep up; by its spring, a ballance to the pressure of the air in the bell: upon each twelve feet descent, the bell is stopt, and the water that enters is driven out by letting in three or four barrels of fresh air.

By the glass above, so much light was transmitted, when the sun shone, that he could see perfectly well to write and read, and

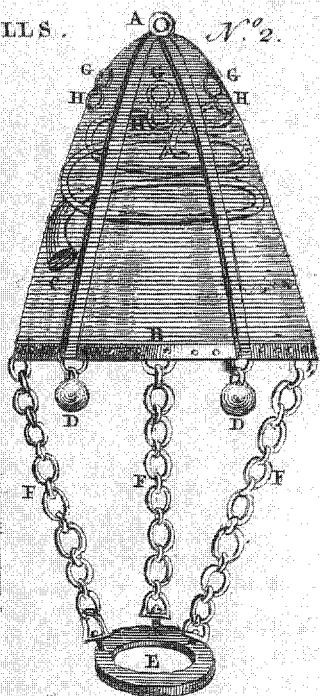


*Fig. 1. DIVING-BELLS.*

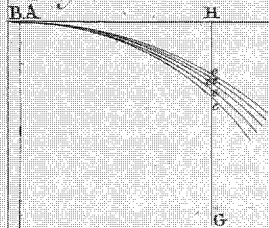
*N<sup>o</sup> 1.*



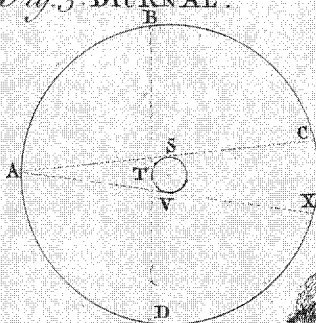
*N<sup>o</sup> 2.*



*Fig. 2. DIVISIBILITY.*



*Fig. 3. DIURNAL.*

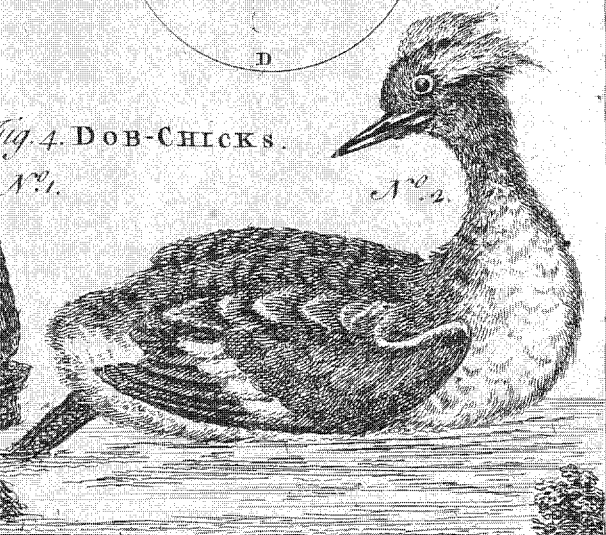


*Fig. 4. DOB-CHICKS.*

*N<sup>o</sup> 1.*



*N<sup>o</sup> 2.*





and by the return of the air-barrels, he could send up orders, written with an iron pen, on small pieces of lead, directing, that they were to be moved from place to place : but in dark weather, when the sea was rough and troubled, it would be as dark as night, in the bell ; but then the doctor perceived he could keep a candle burning in the bell, as long as he pleased, it being found, by experiment, that one candle consumes much about the same quantity of confined air, as one man does, *viz.* about a gallon per minute. The only inconvenience the doctor complained of, was, that upon first going down, they felt a small pain in their ears, as if the end of a quill were forcibly thrust into the hole of the ear. This may proceed from its being some time before the air can get from the mouth, through the small canal of the eustachian tube, which leads to the inner cavity of the ear, where, when it comes, it makes an equilibrium with the outward air, pressing on the tympanum, and thus the pain, for a short time, ceases : then descending lower, the pain of the ear returns, and is again abated ; and so on, till you come down to the bottom, where the air is of the same density continually.

This bell was so improved by the doctor, that he could detach one of his divers to the distance of fifty, or a hundred yards from it, by a contrivance of a cap, or head-piece, somewhat like an inverted hand-basket, as at F, with a glass in the fore-part, for him to see his way through. This cap was of lead, and made to fit quite close about his shoulders ; in the top of it was fixed a flexible pipe, communicating with the bell, and by which he had air, when he wanted, by turning a stop cock near his head-piece. There was also another cock at the end in the bell, to prevent any accident happening from the person without. This person was always well clothed with thick flannels, which were warmed upon him, before he left the bell, and would not suffer the cold water to penetrate. His cap contained air enough to serve him a minute or two : then by raising himself above the bell, and turning the cock F, he could replenish it with fresh air. This pipe he coiled round his arm, which served him as a clue to find his way to the bell again.

This diving bell received its last improvement from Mr. Martin Triewald,

F. R. S. and military architect to his Swedish majesty. The manner and form whereof is shewn in a figure of his own drawing (*ibid.* n<sup>o</sup> 2.) A B is the bell, which sinks with leaden weights D, D, appended at the bottom : the substance of the bell is copper, and tinned within all over : the bell is illuminated with three strong convex lenses G, G, G, with copper lids H, H, H, to defend them. The iron ring, or plate E, serves the diver to stand on, when he is at work, and it is suspended at such a distance from the bottom of the bell, by the chains F, F, F, that when the diver stands upright, his head is just above the water in the bell, where it is much better than higher up in it, because the air is colder, and consequently more fresh, and fit for respiration : but as there is occasion for the diver to be wholly in the bell, and his head of course in the upper part, Mr. Triewald has contrived that, even there, when he has breathed the hot air as long as he well can, by means of a spiral copper tube b c, placed close to the inside of the bell, he may draw the cooler and fresher air from the lowermost parts ; to which end, a flexible leather tube, about two feet long, is fixed to the upper end of the tube at b ; and to the other end of this tube is fixed an ivory mouth-piece for the diver to hold in his mouth, by which to respire the air from below.

**DIVING-BLADDER**, a term used by Borelli, for a machine which he contrived for diving under water to great depths. The vesica, or bladder, as it is called, is to be of brass or copper, and about two feet diameter. This is to contain the diver's head, and is to be fixed to a goat's skin exactly fitted to the body of the diver. Within the vesica are pipes, by means of which, a circulation of air is contrived, and the person carries an air pump by his side, in order to make himself heavier and lighter, as the fishes do by contracting or dilating their air-bladder.

**DIVINITY**, properly signifies the nature, quality, and essence of the true God. See the article **GOD**.

The heathen divinities may be reduced to three classes, 1. Theological, representing the divine nature under divers attributes. Thus Jupiter is the absolute power of God, Juno his justice, &c. 2. Physical. Thus Eolus is that power in nature which collects vapours and exhalations.

halations in order to form winds. 3. Moral. For example, the furies are only the secret reproaches and stings of conscience.

**DIVINITY** is also used in the same sense with theology. See **THEOLOGY**.

**DIVISIBILITY**, that property by which the particles of matter in all bodies are capable of a separation, or disunion from each other.

The Peripatetics and Cartesians hold divisibility to be an affection of all matter. The Epicureans again, allow it to agree to every physical continuum, but they deny that this affection agrees to all bodies, for the primary corpuscles or atoms they maintain to be perfectly insecable and indivisible. See **ATOM**.

As it is evident that body is extended, so it is no less evident that it is divisible; for since no two particles of matter can exist in the same place, it follows, that they are really distinct from each other, which is all that is meant by being divisible. In this sense the least conceivable particle must still be divisible, since it will consist of parts which will be really distinct. To illustrate this by a familiar instance, let the least imaginable piece of matter be conceived lying on a smooth plain surface, it is evident the surface will not touch it every where: those parts therefore which it does not touch, may be supposed separable from the others, and so on, as far as we please; and this is all that is meant when we say matter is infinitely divisible.

The infinite divisibility of mathematical quantity is demonstrated thus geometrically. Suppose the line *AD* (plate LXXV. fig. 2.) perpendicular to *BF*, and another, as *GH*, at a small distance from it, also perpendicular to the same line: with the centers *C C C*, &c. describe circles cutting the line *GH* in the points *eee*, &c. Now the greater the radius *AC* is, the less is the part *eH*. But the radius may be augmented in infinitum, so long therefore, the part *eH* may be divided into still less portions, consequently it may be divided in infinitum.

All that is supposed in strict geometry, (says Mr. Maclaurin) concerning the divisibility of magnitude amounts to no more than that a given magnitude may be conceived to be divided into a number of parts, equal to any given or proposed number. It is true, that the number of parts into which a given

magnitude may be conceived to be divided, is not to be fixed or limited, because no given number is so great but a greater may be conceived and assigned: but there is not, therefore, any necessity of supposing the number of parts actually infinite; and if some have drawn very abstruse consequences from such a supposition, yet geometry ought not to be loaded with them.

How far matter may actually be divided, may in some measure be conceived from hence, that a piece of wire gilt with so small a quantity as eight grains of gold, may be drawn out to a length of thirteen thousand feet, the whole surface of it still remaining covered with gold. We have also a surprising instance of the minuteness of some parts of matter from the nature of light and vision. Let a candle be lighted, and placed in an open plane, it will then be visible two miles round, and consequently was it placed two miles above the surface of the earth, it would fill with luminous particles a sphere whose diameter was four miles, and that before it had lost any sensible part of its weight. A quantity of vitriol being dissolved, and mixed with nine thousand times as much water, will tinge the whole, consequently will be divided into as many parts as there are visible portions of matter in that quantity of water. There are perfumes which without a sensible diminution of their quantity, shall fill a very large space with their odoriferous particles, which must therefore be of an inconceivable smallness, since there will be a sufficient number in every part of that space, sensibly to affect the organ of smelling. Dr. Keill demonstrates that any particle of matter how small soever, and any finite space how large soever being given, it is possible for that small particle of matter to be diffused through all that space, and to fill it in such a manner, as that there shall be no pore in it whose diameter shall exceed any given line. See **EFFLUVIA**.

The chief objections against the divisibility of matter in infinitum are, that an infinite cannot be contained by a finite, and that it follows from a divisibility in infinitum either that all bodies are equal, or that one infinite is greater than another. But the answer to these is easy, for the properties of a determined quantity are not to be attributed to an infinite considered in a general

neral sense; and who has ever proved that there could not be an infinite number of infinitely small parts in a finite quantity; or that all infinities are equal? The contrary is demonstrated by mathematicians in innumerable instances. See the article INFINITE, and 'S Gravelande, Elem. Mathem. lib. 1. cap. iv.

**DIVISION**, in general, is the separating a thing into two or more parts.

**DIVISION**, in arithmetic, one of the four fundamental rules, whereby we find how often a less number, called the divisor, is contained in a greater, called the dividend; the number of times which the divisor is contained in the dividend being termed the quotient.

In effect, division is only a compendious subtraction: for since the divisor is so many times contained in the dividend as there are units in the quotient, if we subtract the former from the latter as many times as possible, the sum of these subtractions will be equal to the quotient. To perform this operation with expedition, one ought to be previously well acquainted with the table of multiplication: thus, if I know that  $5 \times 5 = 25$ , it will be easy for me to say how many times 5 is contained in 25; and so in other instances, where the dividend does not exceed the square of the divisor. But where this is the case, we must follow a different method, which is this: set down the divisor first, and then the dividend, both in the same line, but with a stroke of your pen between them, as in the example in the margin; then beginning from the left hand, set a dot under that part

divis. divid. quot.  
6) 7284 (1214  
6  
12  
12  
8  
6  
24  
24

of the dividend in which the divisor can be found; which is the figure 7, wherein the divisor 6 is found 1: place this 1 after the dividend, only with a stroke between them, and it will make the first

figure of the quotient: you must next multiply the divisor by this number, viz.  $6 \times 1$ , and subtract the product from 7, and there will remain 1; after which place the next figure of the dividend, viz. 2, marking it with a dot, that you may know how many figures of the dividend are taken down. Find how many times the divisor is contained in these two

figures, viz. 12, which is twice exactly: place this 2 in the quotient after the former one, 1; and then multiplying and subtracting, you will find no remainder. However, taking down and dotting the next figure of the dividend, viz. 8, you will find 6 only once in it: place this 1 in the quotient, and multiplying and subtracting as formerly, there will remain 2; after which place the last figure of the dividend, which is also to be doted, and you will have 24, wherein 6 is contained just 4 times; place this 4 in the quotient, and the operation is finished. Hence it appears, that the divisor 6 is contained in the dividend 7284 just 1214 times, as expressed in the quotient.

The method is much the same, when there are several figures in the divisor: thus, in the example annexed, as 54 is 54) 24084 (446 not contained once in 2 or 24, we must take down three figures, viz. 240, and the first dot is to be placed under the 0. We then proceed, and find 54 contained in 240 four

times: this 4 we place in the quotient, and multiplying the divisor 54 by it, and subtracting the product, viz. 216 from 240, there remains 24. After this place the next figure of the dividend, viz. 8, and the sum is 248, in which 54 is found 4 times. Multiply and subtract as formerly, and there will remain 32; after which placing the last figure of the quotient, viz. 4, you will have the sum 324, in which 54 is found just 6 times. So that the divisor 54 is contained in the dividend 24084 exactly 446 times, as expressed in the quotient.

**DIVISION of fractions.** See the articles DECIMAL and FRACTION.

**DIVISION**, in algebra, is performed by placing the dividend above a small line, and the divisor under it; expunging any letters that may be found in all the quantities of the dividend and divisor, and dividing the co-efficients of all the terms by any common measure.

Thus, if  $10ab + 15ac$ , is to be divided by  $20ad$ , they are first placed in this

manner,  $\frac{10ab+15ac}{20ad}$ ; which after expunging the letter  $a$  out of all the terms, and dividing all the co-efficients by 5, is reduced to  $\frac{2b+3c}{4d}$ . In the same man-

$$\text{ner } 2b) ab + bb = \frac{ab + bb}{2b} = \frac{a+b}{2} \cdot A-$$

$$\text{gain, } 12ab) 30ax - 54ay = \frac{30ax - 54ay}{12ab}$$

$$= \frac{5x - 9y}{2b}; \text{ and } 4aa) 8ab + 6ac =$$

$$\frac{8ab + 6ac}{4aa} = \frac{4b + 3c}{2a}; \text{ and, to add no}$$

$$\text{more, } 2bc) 5abc = \frac{5abc}{2bc} = \frac{5a}{2}.$$

With respect to the signs, if those of the divisor and dividend be like, the sign of the quotient must be +; but if they are unlike, the sign must be -.

Powers of the same root, are divided by subtracting their exponents, as they are multiplied by adding them. Thus if  $a^5$  be divided by  $a^2$ , the quotient is  $a^{5-2} = a^3$ ; and  $b^8$  divided by  $b^2$ , gives the quotient  $b^{8-2} = b^6$ ; and so in other cases.

If the quantity to be divided is compound, then its parts must be ranged according to the dimensions of some one of its letters, as in the following example. In the dividend  $a^2 + 2ab + b^2$ , they are ranged according to the dimensions of  $a$ , the quantity  $a^2$ , where  $a$  is of two dimensions, being placed first;  $2ab$ , where it is of one dimension, next; and  $b^2$ , where  $a$  is not to be found, last. The divisor  $a + b$  being ranged in the same manner, you are to divide the first term of the dividend, by the first term of the divisor; and after setting down the quotient, which in this case is  $a$ , multiply this quotient by the whole divisor, and subtract the product, viz.  $a^2 + ab$  from

$$\begin{array}{r} a+b) a^2+2ab+b^2(a+b) \\ \underline{a^2+ab} \phantom{+b^2} \\ ab+b^2 \\ \underline{ab+b^2} \\ 0 \end{array}$$

the two first terms of the dividend  $a^2 + 2ab$ , and the remainder  $ab$ , together with the last term  $b^2$ , gives a new dividend  $ab + b^2$ . Divide the first term of this new dividend, by the first term of the divisor, and set down the quotient, which in this example is  $b$ ; then multiplying the whole divisor by this part of the quotient, subtract the product from the new dividend; and if there is no remainder, as is the case here, the division is finished. If there is a remainder, you are to proceed after the same manner till no remainder is left, or till it appear that there will always be some remainder, as in the annexed examples.

Example I. without any remainder.

$$\begin{array}{r} 3a-6) 6a^4-9b(2a^3+4a^2+8a+16 \\ \underline{6a^4-12a^3} \phantom{-9b} \\ 12a^3-9b \\ \underline{12a^3-24a^2} \phantom{-9b} \\ 24a^2-9b \\ \underline{24a^2-48a} \phantom{-9b} \\ 48a-9b \\ \underline{48a-9b} \\ 0 \end{array}$$

Example II. with a remainder.

$$\begin{array}{r} a+x) a^2+x^2(a-x+\frac{2x^2}{a}-\frac{2x^3}{a^2}+\frac{2x^4}{a^3}-\frac{2x^5}{a^4}+c. \\ \underline{a^2+ax} \phantom{+x^2} \\ -ax+x^2 \\ \underline{-ax-x^2} \phantom{+x^2} \\ +2x^2 \\ \underline{+2x^2+\frac{2x^3}{a}} \\ -2x^3 \\ \underline{-2x^3} \phantom{+x^2} \\ a \\ \underline{-2x^3+\frac{2x^4}{a^2}} \\ a \\ \underline{+2x^4} \\ a^2, \&c. \end{array}$$

In this last example the signs are alternately + and -, the co-efficient is constantly 2, after the two first terms, and the letters are powers of  $x$  and  $a$ ; so that the quotient may be continued as far as you please, without any farther division. But in common examples of division, after you come to a remainder of one term, as  $2x^2$ , it is usually set down in the quotient, with the divisor under it, after the other terms; and the quotient in the last example will stand thus,  $a - x + \frac{2x^2}{a+x}$ .

As for the other signs of division, see the article CHARACTER.

**DIVISION**, among logicians, is the explication of a complex idea, by enumerating the simple ideas whereof it is composed; in which sense it is nearly allied to definition, only that this last regards names and things, whereas division is employed wholly about ideas.

When the parts of an idea are divided, in order to a clearer explication of the whole, this is called a subdivision: thus, a year is divided into twelve months, a month is subdivided into weeks, weeks into days, days into hours, and so on.

The rules for a good division are these, that the members entirely exhaust the whole;

whole; that they be opposite; that subdivisions be not too numerous; that the whole be first divided into its larger parts, and these into the more remote and minute parts.

**DIVISION**, in natural philosophy, is the taking a thing to pieces, that we may have a more complete conception of the whole: this is frequently necessary in examining very complex beings, the several parts of which cannot be surveyed at one view. Thus, to learn the nature of a watch, the workman takes it to pieces, and shews us the spring, wheels, axles, pinions, ballances, dial-plate, pointer, case, &c. and after describing the uses and figures of each of them apart, explains how they contribute to form the whole machine.

**DIVISION**, in music, the dividing the interval of an octave into a number of less intervals. See **OCTAVE**.

The fourth and fifth divide the octave perfectly, though differently: when the fifth is below, and serves as a basis to the fourth, the division is called harmonic; but when the fourth is below, it is called arithmetical.

To run a division, is to play, or sing, after the manner above-mentioned; that is, to divide the intervals of an octave, fifth, fourth, &c. into as many parts, and as agreeably as possible, which depends intirely upon taste and fancy.

**DIVISION**, in rhetoric, the arrangement of a discourse under several heads, each of which is to be separately spoken to.

**DIVISION of proportion**, among mathematicians. See the article **PROPORTION**.

**DIVISION of a battalion**, are the several parcels into which a battalion is divided in marching. The lieutenants and ensigns march before the divisions.

**DIVISION**, in the sea-language, the third part of a fleet of men of war, and sometimes the ninth part; which last happens when the fleet is divided into three squadrons: for then each squadron is distributed into three divisions. In a sea engagement, the order of battle is to place all the squadrons, and all the divisions of each side, in one line. This order is kept as long as the wind, and other circumstances will permit.

**DIVISOR**, in arithmetic, the number that divides another, called the dividend; or, which shews into how many parts the dividend is to be divided. See the article **DIVISION**.

**DIUL**, a port-town of Asia, situated on the indian ocean, westward of the river Indus, and sixty miles west of the city of Tatta: east long. 67°, and north lat. 25° 15'.

**DIVORCE**, a breach or dissolution of the bond of marriage. See **MARRIAGE**.

The usual divorces, among us, are of two kinds, *viz.* a *mensa & thoro*, from bed and board, and a *vinculo matrimonii*, from the bond or tie of marriage. That a *mensa & thoro*, does not dissolve the marriage; since the cause thereof is subsequent to it, and, at the same time, supposes the marriage to be lawful: and this divorce may be on account of adultery in either of the parties, for cruelty of the husband, &c. As this divorce dissolves not the marriage, it does not debar the woman of her dower, nor bastardize her issue, or make void any estate for the life of the husband and wife, &c. A divorce a *vinculo matrimonii* entirely dissolves the marriage, as a pre-contract with some other person, consanguinity, or affinity within the levitical degrees, impotency, impuberty, &c. The consequences attending this last divorce are, that the dower is gone thereby, and the children begotten between the parties divorced are bastards: but here, it is said, the wife shall receive all again that she brought with her; because the nullity of the marriage arises from some impediment, and the goods of the wife were given for her advancement in marriage, which now ceases: yet this is when the goods are not spent; for if the husband gives them away during the coverture, without any collusion, it shall be binding to her. A divorce remains good so long as the sentence continues, and issue of a second marriage shall inherit lands until such sentence is repealed. See **BASTARD**. On the divorce a *vinculo*, &c. the parties are at liberty to marry again; and in divorces for adultery, several acts of parliament have allowed the innocent party marriage with another person. Divorces are only to be had by consent of parliament.

Among the Hebrews, divorce was made for the advantage of the wives, that they might not be discharged nor turned out of doors at pleasure: it was necessary that a bill of divorce should be executed in form by the husband: the wife was obliged to remain ninety days after the divorce, before she married again, that it might be known, if she proved with child,

whole

whose it was. The first husband was never allowed to marry her again, after being married, or even contracted, to another; otherwise he might. The mahometans, usually fond of copying after the Jews, differ from them in this particular, allowing a man to take his wife again, though he had divorced her three times. It is observed, that the women among the Jews, in the latter time of their government, took the same liberty as the men, and divorced their jealous and disagreeable husbands.

The grecian laws concerning divorces, were different: some permitted men to put away their wives on slight occasions: the Cretans allowed it to any man that was afraid of having too great a number of children. The Athenians likewise did it upon very small grounds, but not without giving a bill, wherein was contained the reasons of the divorce, to be approved, if the party divorced made an appeal to the chief magistrate. The Spartans, though marrying without much nicety in choice, seldom divorced their wives. At Athens, persons that divorced their wives, were obliged to return their portions, or to pay them an alimony: here a woman might also sue for a divorce. The distinction of *repudium* and *divortium*, among the Romans, was owing to the nicety of their lawyers: the first they made the breaking of a contract; the last, a separation after actual matrimony. By the laws of Romulus, a man was at liberty to leave his wife, but not a wife to leave her husband. The man might divorce his wife either upon poisoning her children, counterfeiting his private keys, or for the crime of adultery: but if he put her away upon any other occasion, one moiety of his estate was to be given to his wife, and the other was to fall to the goddess Ceres.

**DIURESIS**, in medicine, an excretion of urine: whence,

**DIURETICS**, in pharmacy, such simples as increase the discharge of urine; or which are supposed to have a power of removing obstructions in the urinary passages. Diuretics must increase the liquor to be secreted in the proper glandules, and are of the five following kinds: the first contains all relaxing and emollient decoctions, emulsions, &c. which do not stimulate, but only remove obstructions, by relaxing the vessels. The second comprehends all those which dissolve and dilute the blood. The third

contains three kinds of medicines, 1. AN acids which stimulate the vessels. 2. All saline bodies. 3. All fixed and volatile salts. The fourth takes in all that preserve a moderate heat of the body, without sweat. The fifth class contains those whose effects discover themselves about the kidneys and bladder; also all acrid and solvent diuretics.

**DIURNAL**, in astronomy, something relating to the day, in opposition to nocturnal, which regards the night.

**DIURNAL ARCH**, the arch or number of degrees that the sun, moon, or stars describe between their rising and setting.

**DIURNAL CIRCLE**. See **CIRCLE**.

**DIURNAL motion of a planet**, is so many degrees and minutes as any planet moves in twenty-four hours. Hence the motion of the earth about its axis, is called its diurnal motion. See **EARTH**.

**DIURNAL** is also used in speaking of what belongs to the nyct-hemeron, or natural day of twenty-four hours, in opposition to annual, menstrual, &c. The diurnal phenomena of the heavenly bodies, arise from the motion of the earth round its axis. For since the earth turns round its own axis from west to east, every spectator on its surface must necessarily be carried round in the same way; and consequently those parts of the heavens which lie hid towards the east, will by and by come into his sight, and those which are visible to him, will depart out of it towards the west. From hence it is that the spectator not being sensible of his own motion (the reason of which is, because all things about him move along with him) imagines the whole heavens to turn round the contrary way, viz. from east to west every twenty-four hours, which is nearly the time in which the earth performs one revolution about its axis. This may be illustrated in the following manner.

Let the circle STV (plate LXXV. fig. 3.) represent the earth; S, the place of the spectator; ABC, so much of the heavens as is visible to him in that situation; and let A be the place of the sun, or any other of the heavenly bodies. When S, the place of the spectator, is carried by the rotation of the earth about its axis to T, the visible part of the heavens will become BAD; and the point A, which before was just at one edge of the visible portion of the heavens, is now in the midst of it, or directly over the spectator's head. Again, when the spectator is got to V, the visible part of the heavens



heavens is become ADX, and the point A is got to the other extremity of it, and just ready to disappear; after which it is seen no more till the spectator arrives at the point S again. From this motion of the earth arises that apparent revolution of the planets and fixed stars once in twenty-four hours, as also that of the sun, and therewith the succession of day and night. See EARTH.

DIURNAL *parallax*. See PARALLAX.

DIURNARY, *diurnarius*, an officer in the greek empire, who wrote down in a book, kept for that purpose, whatever the prince did, or ordered, &c. every day.

DIUTURNITY, in chronology, the length of duration, or long continuance of any being. See the article DURATION.

DIVUS and DIVA, in antiquity, appellations given to men and women who had been deified. See DEIFICATION.

We find this title on medals struck for the consecration of an emperor or empress: thus, DIVVS IVLIVS, DIVA FAVSTINA AVG. &c.

DIXMUDE, a town of Flanders, situated on the river Ypres, about eleven miles north of the city of Ypres, and thirty-three west of Ghent: east long. 2° 40', and north lat. 51°.

DIZIER, or ST. DIZIER, a city of Champagne in France, situated on the river Marne, about forty-five miles north-east of Troyes: east long. 5°, and north lat. 48° 32'.

DIZOSTOS, in botany, a name used by the Greeks for the tuberose rooted tithymal, comprehended by Linnæus among the euphorbia. See the article EUPHORBIA.

\* DIZZINESS, in medicine, a disease of the head, called by physicians vertigo. See the article VERTIGO.

DO, in music, a note of the italian scale, corresponding to *ut* of the common gamut. See the article GAMUT.

DO LAW, the same with make law. See the article MAKE.

DOB-CHICK, in ornithology, the english name of the colymbus minor. See the article COLYMBUS.

It is a pretty little bird, smaller than the common teal; and, as it is seen swimming, appears like the young of some of the duck-kind; not yet fledged or feathered. But what is most singular in it, is, its having absolutely no tail. See plate LXXV. fig. 4. n° 1.

There are several other species of this bird, one of the most elegant of which is the eared dob-chick, of a blackish

brown on the upper part of the back, except the ridge thereof, which is white; the ears are formed of a tuft of loose, long, and reddish feathers. *Ibid.* n° 2.

DOBLAC, a town of the Tyrolese, in Germany, situated at the foot of the Alps, about two miles north of the frontiers of the state of Venice.

DOBULA, in ichthyology, a name used by some for the chub. See CHUB.

DOCIMASIA, in greek antiquity, a probation of the magistrates and persons employed in public business at Athens. It was performed publicly in the forum, where they were obliged to give account of themselves and their past life before certain judges. Among several questions proposed to them, we find the following, whether they had been dutiful to their parents, had served in the wars, and had a competent estate.

DOCK, *lapathum*, in botany and medicine. See LAPATHUM.

DOCK, or DOCKING, in law, an expedient for cutting off an estate-tail in lands or tenements, that the owner may be enabled to sell, give, or bequeath the same.

Dock, in maritime affairs, is a pit, great pond, or creek, by the side of an harbour, made convenient either for the building or repairing of ships. It is of two sorts, 1. Dry-dock, where the water is kept out by great flood-gates, till the ship is built or repaired, when the gates are opened, and the water let in to float and launch her. 2. Wet-dock, a place where the ship may be halled into, out of the tide's way, and so dock herself, or sink herself a place to lie in.

Dock, in the manege, called by the French trouffequue, is a large case of leather, as long as the dock of a horse's tail, which covers the tails of leaping horses. It is made fast by straps to the crupper, and has leathern thongs that pass between his thighs, and along the flanks to the saddle-straps, in order to keep the tail tight, and to hinder it to whisk about, or make the horse appear broader at the croupe.

Dock, among sportsmen, the fleshy part of a boar's chine, between the middle and the buttocks.

DOCK-YARDS, in ship-building, are magazines of all sorts of naval stores. The principal ones in England are those of Chatham, Portsmouth, Plymouth, Woolwich, Deptford, and Sheerne's. In time of peace, ships of war are laid up in these docks; those of the first rates mostly at Chatham,

Chatham, where, and at other yards, they receive from time to time such repairs as are necessary. These yards are generally supplied from the northern crowns with hemp, pitch, tar, rosin, &c. but as for masts, particularly those of the larger size, they are brought from New England.

How much it imports the good of the public to keep these magazines constantly replenished, every one is able to judge; and it were to be wished the improving the before-mentioned commodities, in our english plantations, might meet with all possible encouragement, lest, one time or other, it may prove difficult to get them elsewhere.

**DOCKET**, a little bill tied to wares or goods, directed to the person or place they are to be sent to.

**DOCKET**, or **DOGGET**, in law, signifies a brief in writing, made on a small piece of paper, or parchment, containing the purport and effect of a large writing. The rolls of judgment, when brought into the court of common pleas, are entered on the docket of that term: and attorneys keep docket-books, where-in they enter judgments.

**DOCTOR**, a person who has passed all the degrees of a faculty, and is impowered to teach or practise the same: thus we say, doctor in divinity, doctor in physic, doctor of laws.

The title of doctor seems to have been created in the XIIth century, instead of *master*, and established with the other scholastic degrees of batchelors and licentiates, by Peter Lombard and Gilbert Porreus, then the chief divines of the university of Paris. Gratian did the same thing, at the same time, in the university of Bologna. Though the two names of *doctor* and *master* were used a long time together, yet many think that their functions were different, the masters teaching the human sciences, and the doctors those sciences depending on revelation and faith. Spelman takes the title of doctor not to have commenced till after the publication of Lombard's Sentences, about the year 1140, and affirms that such as explained that work to their scholars were the first that had the appellation of doctors.

To pass doctor in divinity at Oxford, it is necessary the candidate have been four years batchelor of divinity. For doctor of laws, he must have been seven years in the university to commence batchelor of

law, five years after which he may be admitted doctor of laws. Otherwise in three years after taking the degree of master of arts, he may take the degree of batchelor in laws, and in four years more that of doctor: which same method and time are likewise required to pass the degree of doctor in physic. At Cambridge, to take the degree of doctor in divinity, it is required the candidate have been seven years batchelor of divinity: though in several colleges the batchelor's degree is dispensed with, and they may go out *per saltum*. To commence doctor in laws, the candidate must have been five years batchelor of laws, or seven years master of arts. To pass doctor in physic, he must have been batchelor in physic five years, or seven years master of arts. It is remarkable, that by a statute of 37 Hen. VIII. a doctor of civil law may exercise ecclesiastical jurisdiction, though a layman.

**DOCTOR**, is also an appellation adjoined to several specific epithets, expressing the merit of some of the schoolmen: thus Alexander Hales is called the irrefragable doctor; Thomas Aquinas, the angelic doctor; St. Bonaventure, the seraphic doctor; John Duns Scotus, the subtle doctor; Raimond Lully, the illuminated doctor; Roger Bacon, the admirable doctor, &c.

**DOCTOR of the church**, a title given to certain of the fathers, whose doctrines have been most generally received: of these are usually reckoned four in the greek church, *viz.* St. Athanasius, St. Basil, St. Gregory Nazianzen, and St. Chrysostom: and three in the latin church, namely St. Jerom, St. Augustine, and Gregory the great.

**DOCTOR, διδασκαλος**, in the greek church, is a particular officer appointed to interpret part of the scripture. He who explains the gospels is called doctor of the gospels; he who explains St. Paul's Epistles, doctor of the apostle; and he who interprets the Psalms, doctor of the psalter. The grecian bishops still confer those sort of offices by imposition of hands, as it is practised in ordinations.

**DOCTOR of the law**, a title of honour among the Jews. The investiture, if we may so say, of this order was performed by putting a key and a table-book in their hands, which is what some authors imagine our Saviour had in view, Luke xi. 52. when speaking of the doctors of the law, he says, "Woe unto you, doctors of the law, for you have taken away

away the key of knowledge, you entered not in yourselves, and them that were entering you hindered." The greek text of St. Luke calls them *νομικοι*, and the vulgate *legis periti*: agreeably to which our english translators call them *lawyers*. The word *νομικος*, however, in St. Matt. is rendered by the vulgate *legis doctor*, though the english version still retains the word *lawyer*.

These jewish doctors are otherwise called rabbins. See the article RABBI.

DOCTORS-COMMONS. See COLLEGE of *civilians*.

DOCUMENT, in law, some written monument produced in proof of any thing asserted.

DODARTIA, in botany, a genus of the *didymia-angiospermia* class of plants, the flower of which consists of one ringent petal, with the upper lip erect and semibifid; and the lower lip patent, twice broader than long, and trifid: the fruit is a globose bilocular capsule, containing a great number of very small seeds. See plate LXXVI. fig. 1.

DODDER, the english name of a plant, called by authors *cuscuta*. See the article CUSCUTA.

DODECACTIS, in zoology, a species of star-fish with twelve rays.

DODECADACTYLON, in anatomy, the same with the duodenum. See the article DUODENUM.

DODECAGON, in geometry, a regular polygon consisting of twelve equal sides and angles.

DODECAGON, in fortification, is a place surrounded by twelve bastions.

DODECAHEDRON, in geometry, one of the platonic bodies, or regular solids, contained under twelve equal and regular pentagons.

Its solidity is found by multiplying the area of one of the pentagons by 12, and then this product by  $\frac{1}{3}$  of the distance of the face from the center of the dodecahedron, which is the same with the center of the circumscribing sphere.

The side of a dodecahedron, inscribed in a sphere, is the greater part of the side of a cube, inscribed in the same sphere, cut into extreme and mean proportion. If the diameter of the sphere be 1.0000, the side of the dodecahedron, inscribed in it, will be .3682 nearly.

All dodecahedrons are similar, and are to one another as the cubes of their sides; their surfaces are also similar, and therefore they are as the squares of their sides;

whence as .509282 is to 10.51462, so is the square of the side of any dodecahedron to the superficies thereof; and as .3637 is to 2.78516, so is the cube of the side of any dodecahedron to the solidity of it.

DODECANDRIA, in the linnæan system of botany, a class of plants, the eleventh in order, comprehending all those with hermaphrodite flowers, and only twelve stamina in each: such are agrimony, asarum, rhizophora, &c.

DODECATEMORY, an appellation given to the twelve signs of the zodiac, because each of them contains a twelfth part of the whole. See SIGN.

It is also applied to the twelve houses or parts of the zodiac of the primum mobile, to distinguish them from the twelve signs. See the article HOUSE.

DODECUPLA DI CROME, in the italian music, a name given to the triple  $1\frac{2}{3}$ , in four of which twelve notes are required, instead of four in common time.

DODECUPLA DI SEMI CROME, is our triple  $1\frac{2}{3}$ , wherein there are twelve notes instead of sixteen, in a bar of duple time.

DODO, in ornithology, a large exotic bird, supposed to belong to the swan-kind, only some-what bigger than the common swans: add to this, that its head is covered with a membrane resembling a hood. See plate LXXVI. fig. 2.

DODONÆA, in botany, a genus of plants, of the *oëlandria-monogynia* class: it has no corolla; the fruit is a roundish trilocular capsule, with prominent inflated angles, containing solitary seeds.

DODONÆA is also a name given by Plu-mier to the ilex. See ILEX.

DODONIAN, *dodoneus*, in antiquity, an epithet given to Jupiter, because he was worshiped in a temple built in the forest of Dodona, where was the most famous and it is said the most antient oracle of all Greece. It is reported that the pigeons and the very oaks of the forest of Dodona spoke and delivered oracles. In the temple was a fountain, which the antient naturalists assure us had a property of re-kindling torches when newly extinguished. It is also said to have extinguished lighted torches, which is no great miracle, since plunging them into a place where the air was too dense, or into the water, must necessarily have that effect.

DODRANS, in antiquity, three fourths of the as. See the article AS.

**DOESBURG**, a town of the United Netherlands, in the province of Guelderland, situated on the river Yffel, about nine miles south of Zutphen: east long. 6°, and north lat. 52°.

**DOFRINE MOUNTAINS**, those which divide Sweden from Norway.

**DOG**, *canis*, in zoology, a genus of quadrupeds. See the article **CANIS**.

The dog, in its wild state, lives comfortably in the woods, in many parts of the east: it does not attack a man, but neither does it discover any of that familiarity which we find in the tame ones; and indeed many other animals may be made as tame as the dog, by the same kind of treatment, which has been tried on the otter with success.

Authors have mentioned a great many species of this animal, as the mastiff, wolf-dog, greyhound, hound, spaniel, water-spaniel, bull-dog, lap-dog, &c. but all these are only varieties of the original wild kind, which is of a middle size between the mastiff and greyhound.

*Choosing of Dogs.* In order to choose a dog and bitch for good whelps, take care that the bitch come of a generous kind, be well proportioned, having large ribs and flanks, and likewise that the dog be of a good breed and young. Hounds for chase are to be chosen by their colours; the white with black ears and a black spot at the setting on of the tail, are the best to compose a kennel of, and of good scent. The black hound, or the black tanned, or the liver-coloured or white; the true talbots, are the best for the stronger line: the grizel, whether mixed or unmixed, so they be shag-haired, are the best verminers, and a couple of these are proper for a kennel. In short, take these marks of a good hound, that his head be of a middle proportion, rather long than round; his nostrils wide; the ears large; his back fowed; his fillet great; haunches large; thighs well trussed; ham straight; tail big near the reins, the rest being slender; the leg big; the sole of the foot dry, and in the form of that of a fox with large claws.

*Bite of a mad Dog*, in medicine. See the article **HYDROPHOBIA**.

**DOG**, *canis*, in astronomy. See **CANIS**.

**DOG'S BANE**, *apocynum*, in botany, a genus of the *pentandria digynia* class of plants, the corolla of which consists of a campanulated, roundish, single petal, lightly divided into five segments, which are revolute: there is no other nectarium;

the fruit is composed of oblong, acuminate follicles, each formed of two valves and containing one cell; the seeds are numerous, very small, and coronated with long down.

**DOG-BERRY-TREE**, a name sometimes used for the cornel-tree. See **CORNUS**.

**DOG-DAYS**, the same with those called canicular. See **CANICULAR**.

**DOG-DRAW**, a term in the forest-law, used when a man is found drawing after a deer, by the scent of a hound which he leads in his hand.

**DOG'S FENNEL**, in botany, a name by which the cotula is sometimes called. See the article **COTULA**.

**DOG-FLY**, a kind of fly so called from its being particularly troublesome to dogs: it is not unlike that species which infests cattle.

**DOG'S GRASS**. See the article **GRASS**.

**DOG'S MERCURY**, in botany, the name of a species of mercury. See **MERCURY**.

**DOG'S ROSE**, a name sometimes given to the common briar, or hip-bush, a species of wild rose. See the article **ROSE**.

**DOG'S STONES**, a species of orchis, said to be a great provocative to venery.

**DOG'S TAIL**, in botany, the same with the cynosurus. See **CYNOSURUS**.

**DOG'S TONGUE**, a plant called by botanists cynoglossum. See **CYNOGLOSSUM**.

**DOG'S TOOTH**, *dens canis*, a plant called by Linnæus, erythronium. See the article **ERYTHRONIUM**.

**DOG'S TOOTH SHELL**, the same with the dentalium. See **DENTALIUM**.

**DOG-WOOD**, the same with the dog-berry-tree, *supra*.

**DOG-WOOD of Jamaica**, the robinia of botanical writers. See **ROBINIA**.

**DOG-WOOD of Virginia**, a species of bay-tree. See the article **LAURUS**.

**DOGADO**, a dutchy of Italy, of which Venice is the capital. See **VENICE**.

**DOGE**, the chief magistrate in the republics of Venice and Genoa.

This dignity is elective in both places: at Venice it continues for life, at Genoa it is only for two years. His title is serenity: he is chief of the council, and mouth of the republic, he being to answer for her. The Venetians do not go into mourning at his death, being only the phantom of majesty, as all the authority is vested in the republic; the doge only lends his name to the senate; the power is diffused through the whole body though answers to foreign ambassadors, &c. are made in the name of the doge.

The

The money is struck in his name, but does not bear his arms. All the magistrates rise and salute him when he comes into the council : but he rises to none but foreign ambassadors. He must not stir out of Venice, without leave of the counsellors, &c.

**DOGGERS**, in the alum-works, a poor kind of alum-ore. See **ALUM**.

**DOGGERS** is also a name used for fishing vessels ; whence, in some of our old statutes, we meet with dogger-men, denoting the fishermen of those vessels.

**DOGS** denote iron machines for burning wood on ; also hooks fixed in large timbers, for drawing them with horses.

**DOGMA**, a principle, maxim, tenet, or settled opinion, particularly with regard to matters of faith and philosophy.

**DOGMATICAL**, something belonging to a doctrine or opinion. A dogmatical philosopher is one who asserts things positively ; in opposition to a sceptic, who doubts of every thing.

**DOGMATISTS**, *dogmatici*, a sect of ancient physicians, of which Hippocrates was the first author. They are also called *logici*, logicians, from their using the rules of logic in subjects of their profession. They laid down definitions and divisions, reducing diseases to certain genera, and those genera to species, and furnishing remedies for them all ; supposing principles, drawing conclusions, and applying those principles and conclusions to particular diseases under consideration : in which sense the dogmatists stand contradicting distinguished from empirics and methodists. They reject all medicinal virtues that they think not reducible to manifest qualities : but Galen hath long ago observed of such men, that they must either deny plain matter of fact, or assign but very poor reasons and causes of many effects they pretend to explain.

**DOLE**, in our ancient customs, signified a part, or portion, most commonly, of a meadow, where several persons have shares. It also still signifies a distribution or dealing of alms, or a liberal gift made by a great man to the people.

**DOLE-FISH** seems to be that fish which the fishermen, yearly employed in the north seas, do, of custom, receive for their allowance or shares.

**DOLE**, in the law of Scotland, is used for malevolent intention.

Dole, in the law of Scotland, as well as *dolum* in the civil law, from whence it is taken, is an essential ingredient to consti-

tute an action criminal. In crimes wherein the will, not the event, must be regarded, no negligence can equal dole, unless the negligence be so extremely supine as not to be conceivable without implying dole.

Under dole are comprehended the vices and errors of the will, which are immediately productive of the criminal fact, though not premeditated, but the effect of sudden passion. In this respect dole differs from what the english law calls malice. See the article **MALICE**.

**DOLET**, a term sometimes used for red vitriol, or colcothar of vitriol.

**DOLG-BOTE**, in our old writers, signifies a recompence for a scar or wound.

**DOLICHOS**, in botany, a genus of the *diadelphia-decandria* class of plants, the corolla of which is papilionaceous ; the vexillum is roundish, large, emarginated, and wholly reflected ; the fruit is a large, acuminate, oblong pod, composed of two valves, and containing two cells ; the seeds are numerous, elliptical, and frequently compressed.

**DOLIMAN**, a kind of long cassock, worn by the Turks, hanging down to the feet, with narrow sleeves buttoned at the wrist.

**DOLIUM**, in natural history, the name of a genus of shells, called by some *conchæ-globosæ*.

The dolium is a simple shell, without any hinge, formed of one continuous piece, which makes a body of a figure approaching to round, distended, and, as it were, inflated. The animal inhabiting this shell is a limax. See the article **LIMAX**.

Some of these have the mouth dentated ; others smooth ; in some the clavicle is moderately long, though in most it is depressed ; and the columella is in some species smooth, in others wrinkled : these shells are found on the shores of many parts of the East-indies, and are also frequently brought from America. See plate **LXXVI**. fig. 3.

**DOLLAR**, a silver coin current in several parts of Germany and Holland. There are various species of dollars, as the rix-dollar, the semi-dollar, the quarter-dollar, &c. for each of which see **COIN**.

**DOLPHIN**, in ichthyology, the english name of the *delphinus*, with an oblong rounded body, and a long acute rostrum. It is considerably longer than the porpoise : the opening of the mouth is vastly wide, reaching on each side to the breast ;

and

and the fistula, or aperture for discharging the water, is in the middle of its head. See plate LXXVI. fig. 4.

**DOLPHIN** is also a name given by some to the hippurus. See **HIPPURUS**.

**DOLPHIN**, *delphinus*, in astronomy. See the article **DELPHINUS**.

**DOM**, or **DON**, a title of honour, invented and chiefly used by the Spaniards, signifying sir, or lord.

This title, it seems, was first given to Pelayo, in the beginning of the VIIIth century. In Portugal no person can assume the title of don, without the permission of the king, since it is looked upon as a mark of honour and nobility. In France it is sometimes used among the religious. It is an abridgment of *domnus*, from *dominus*.

**DOM** and **SOM**, in old charters, signifies full property and jurisdiction.

**DOMAIN**, the inheritance, estate, or possession of any one. See **DEMESNE**.

**DOME**, in architecture, a spherical roof, or a roof of a spherical form, raised over the middle of a building, as a church, hall, pavillion, vestibule, stair-case, &c. by way of crowning.

Domes are the same with what the Italians call cupolas, and we cuppolas: Vitruvius calls them tholi. See the article **CUPOLA**, &c.

They are generally made round, or resembling the bell of a great clock; but there are some instances of square ones, as those of the Louvre. Some of them also are in the form of polygons, as that of the jesuit's church in the Rue St. Antoine, at Paris. Domes have commonly columns ranged around their outides, both for the sake of ornament and support to the work.

**DOME**, or **DOOM**, signifies also a sentence, judgment, or decree.

**DOMEA**, a great river of Tonquin, in Asia, sometimes called Chaule.

**DOMESDAY**, or **DOOMS-DAY-BOOK**, a very ancient record made in the time of William the Conqueror, which now remains in the exchequer, and consists of two volumes, a greater and a less; the greater contains a survey of all the lands in most of the counties in England, and the less comprehends some counties that were not then surveyed. The book of domesday was begun by five justices, assigned for that purpose in each county, in the year 1081, and finished in 1086. It was of that authority, that the Conqueror himself submitted, in some cases wherein

he was concerned, to be determined by it. Camden calls this book the Tax-book of king William; and it was farther called Magna rolla.

There is likewise a third book of *Domesday*, made by command of the Conqueror; and also a fourth, being an abridgment of the other books.

**DOMES-MEN**, judges or persons appointed to determine suits and controversies between parties. See **DAY'S MAN**.

**DOMESTIC**, any man who acts under another, serving to compose his family; in which he lives, or is supposed to live, as a chaplain, secretary, &c. Sometimes domestic is applied to the wife and children, but very seldom to servants, such as footmen, lacquies, porters, &c.

**DOMESTIC**, *domesticus*, in antiquity, was a particular officer in the court of Constantinople.

According to some, this officer was one intrusted to manage affairs of importance: others say, the greek *domestici* were the same with the roman *comites*; and that they began first to be used when count became a dignity; domestics therefore were such as served the prince in the administration of affairs, as well those of the family, as the affairs of justice and the church.

*The grand DOMESTIC*, or **MEGADOMESTICUS**, was a sort of dapifer, or major domo. See the articles **DAPIFER** and **MAJOR DOMO**.

**DOMESTICUS MENSÆ**, officiated as grand seneschal, or steward.

**DOMESTICUS REI DOMESTICÆ**, did the office of master of the household.

**DOMESTICUS SCHOLARUM**, or **LEGIONUM**, commanded the reserved forces, called *scholæ palatinæ*, whose office it was to put the immediate orders of the emperor in execution.

**DOMESTICUS MURORUM** had the superintendence of all the fortifications.

**DOMESTICUS REGIONUM** was a sort of attorney, or solicitor-general, of the east and west.

**DOMESTICUS ICANATORUM** commanded the military cohorts. There were several other officers of the army, who were called by the name *Domesticus*, which meant no more than their commander. There were also two *domestici chori*, or chantors, called also *protopsalter*, belonging to the church at Constantinople; one of them was on the right side of the church, and the other on the left.

**DOMESTICI**,

**DOMESTICI**, was also a body of forces in the roman empire.

Pancirollus takes them to be the same with those called *protectores*, who had the chief guard of the emperor's person, in a degree above the prætorians, and who, under the christian emperors, had the privilege to bear the grand standard of the cross. They are supposed to have been 2500 before Justinian's time, who added 2000 more to the number. They were divided into several companies, or bands, called *scholæ*. Some whereof are said to have been instituted by Gordian: some of them were cavalry, and others infantry. Their commander was called *comes domesticorum*.

**DOMESTIC NAVIGATION**, coasting, or sailing along the shore, in which the lead and compass are the chief instruments.

**DOMIFYING**, in astrology, the dividing or distributing the heavens into twelve houses, in order to erect a theme, or horoscope, by means of fix great circles, called circles of position.

There are various ways of domifying: that of Regiomontanus, which is the most common, makes the circles of position pass through the intersections of the meridian and the horizon: others make them pass through the poles of the zodiac.

**DOMINANT of a mode**, in music, that sound which makes a perfect fifth to the final in authentic modes; and a third to the final or sixth, to the lowest chord of a plagal mode. See the articles **MODE** and **FINAL**.

**DOMINATION**, in theology, the fourth order of angels, or blessed spirits, in the hierarchy, reckoning from the seraphim.

**DOMINGO**, or **ST. DOMINGO**, the capital of the island of Hispaniola, the see of an archbishop, and the most antient royal audience in America: west long. 70° north lat. 18° 20'.

**DOMINI**, or **ANNO DOMINI**. See the article **ANNO**.

*Bull in cæno DOMINI*. See the article **BULL**.

**DOMINICA**, one of the Caribbee-islands, subject to Britain: west long. 61° 20' north lat. 16°.

**DOMINICAL LETTER**, in chronology, is that letter of the alphabet which points out in the calendar the Sundays throughout the year, thence also called *Sunday-letter*. See **CALENDAR** and **BISSEXTILE**. The distribution of days into weeks is

made by the seven first letters of the alphabet A, B, C, D, E, F, G, beginning, at the first of January, to place the letter A; to the second of January B is joined; to the third C; and so on to the seventh, where G is figured: and then again beginning with A, which is placed at the eighth day, B will be at the ninth, C, at the tenth, and so continually repeating the series of these seven letters, each day of the year has one of them in the calendar. By this means the last of December has the letter A joined to it, for if the 365 days, which are in a year, be divided by seven, we shall have fifty-two weeks, and one day over. If there had been no day over, all the years would constantly begin on the same day of the week, and each day of a month would constantly have fallen on the same day of the week: but now, on account, that besides the fifty-two weeks in the year, there is one day more, it happens, that on whatever day of the week the year begins, it ends upon the same day, and the next year begins with the following day.

The letters being ranked in this order, that letter which answers to the first Sunday of January, in a common year, will shew all the Sundays throughout the year, and to whatever days in the rest of the months, that letter is put, these days are all Sundays. If the first day of January be on a Sunday, the next year will begin on Monday, and the Sunday will fall on the seventh day, to which is annexed the letter G, which therefore will be the Sunday letter for that year: the next year beginning on Tuesday, the first Sunday will fall on the sixth of January, to which is adjoined the letter F, which is the Sunday letter for that year; and in the same manner, for the next following, the dominical letter will be E; and so on. By this means the Sunday letters will go on in a retrograde order, *viz.* G, F, E, D, C, B, A. But because every fourth year consists of 366 days, the series of letters will be interrupted, and the order will not return till twenty-eight years, or four times seven; and hence arises the cycle of twenty-eight years. See the article *CYCLE of the Sun*.

Thus, if in a leap year, the first of January be Sunday, and consequently the dominical letter A, the twenty-fourth day of February will fall on a Friday, and the twenty-fifth on a Saturday; and

Since both these days are marked in the calendar with the letter F, the following day, which is Sunday, will be marked with G, which letter will mark out all the Sundays, and consequently be the dominical letter the remaining part of the year; and hence it is, that every leap year has two dominical letters, the first of which serves from the beginning of the year to the twenty-fourth or twenty-fifth day of February, and then the other takes place and serves for the rest of the year.

The intercalary day is placed between the twenty-third and twenty-fourth day of February, and so makes two twenty-fourths of February, which in the calendar are esteemed one and the same day, and have the same letter affixed to them; but by our way of reckoning, they are called the twenty-fourth and twenty-fifth days of February.

For finding the dominical letter, divide the year, and its fourth part, by seven, which will give the index of the dominical letter, reckoning 1 for A, 2 for B, 3 for C, &c.

Thus, if it were required to find the dominical letter for the year 1754, it will be found to be F. For, if to the given year 1754, you add its fourth part 438, the sum will be 2192, which divided by 7, the remainder will be 1, and that subtracted from 7, the index will be 6, which corresponds to the letter F.

But as the years 1800, 1900, 2100, 2200, 2300, &c. according to the new stile, consist of 365 days only, and therefore have but one dominical letter, whereas, according to the Julian calendar, they would have two; for this reason the dominical letters will be changed, and consequently this method of finding the dominical letter will only hold good for this century; after which a number must be added to the year, and its fourth, in order to find the dominical letter for ever: for which purpose observe the following rule.

Reject the figures or cyphers to the place of hundreds; divide the remaining figures or cyphers by 4; from this quotient subtract 1, and this number subtracted from the hundred years; and then this last remainder taken from the least number of sevens possible, leaves a number which must be added to the year and its fourth, in order to find the dominical letter: Example, what will be the dominical letter for the year 1842.

This question, by the above rule, will be solved in the following manner,  $18 \div 4 = 4$  from which subtracting 1; and the remainder 3 taken from 18, gives 15, which being subtracted from 21, the nearest sevens gives 6, the number to be added. Then to the given year 1842, add its fourth part 460, and the number found 6, the sum is 2308; which being divided by 7, gives 329 for the quotient, and the remainder is 5; which taken from 7, leaves 2, the index of the letter B, the dominical letter required.

**DOMINICANS**, an order of religious, called in France, jacobins, and in England black fryers, or preaching fryars. This order, founded by St. Dominic, a native of Spain, was approved of Innocent III. in 1215, and confirmed by a bull of Honorius III. in 1216. The design of their institution was, to preach the gospel, convert heretics, defend the faith, and propagate christianity. They embraced the rule of St. Augustine, to which they added statutes and constitutions, which had formerly been observed either by the Carthusians or Præmonstratenses. The principal articles enjoined perpetual silence, abstinence from flesh at all times, wearing of woollen, rigorous poverty, and several other austerities. This order has spread into all the parts of the world. It has produced a great number of martyrs, confessors, bishops; and they reckon three popes, sixty cardinals, 150 archbishops, and 800 bishops of their order, besides the masters of the sacred palace, who have always been dominicans. They are inquisitors in many places.

The nuns or sisters of this order, owe their foundation to St. Dominic himself, who built a monastery at Prouilles, where poor maids might be brought up and supplied with all necessaries for their subsistence. The habit of these religious was a white robe, a tawney mantle, and a black veil. Their founder obliged them to work at certain hours of the day, and particularly to spin yarn and flax to make their own linnen. The nuns of this order have 130 houses in Italy, forty-five in France, fifty in Spain, fifteen in Portugal, forty in Germany, and many in Poland, Russia, and other countries. They lie on straw beds, and never eat flesh excepting in sickness; but many monasteries have mitigated this austerity.



**DOMINION**, *dominium*, in the civil law signifies the power to use or dispose of a thing as we please. *Dominium plenum*, is when the property is united with the possession. *Dominium nudum*, when there is the property without the possession. *Dominium* is again divided into that which is acquired by the law of nations, and that which is acquired by the civil law. The former can never be got without possession, the latter may. Another distinction of *dominium* is, into natural and civil. Natural is that which is common to all nations, or that which is acquired by the means which all nations use in acquiring estates. Civil is peculiar to the roman citizens, and consists of these three methods. Sale, prescription, cession of right. *Directum dominium*, is the right alone of dominion. *Dominium utile*, the profit redounding from it. Thus the wife retains the *dominium directum* of her jointure, and the *dominium utile* passes to her husband.

**DOMINIUM**, domain, in our antient customs. See the article DOMAIN.

**DOMINUS**, in the civil law, he who possesses any thing by right of purchase, gift, loan, legacy, inheritance, payment, contract, or sentence.

**DOMINUS**, in the feudal law, he who grants a part of his estate in fee to be enjoyed by another.

**DOMINUS**, in the antient times, a title prefixed to a name, usually to denote the person either a knight or a clergyman.

*Recto quando DOMINUS remisit.* See the article RECTO.

**DOMO REPARANDO**, in law, is a writ which lies for a person against his neighbour, whose house he fears will fall to the damage of his own.

**DON**, the name of two rivers; one very large, which after dividing Asia from Europe, falls into the Palus Meotis; the other, in the county of Aberdeen in Scotland.

**DONATION**, an act whereby a person transfers to another either the property or the use of some thing, as a free gift. In order to be valid, it supposes a capacity both in the donor and donee, and requires consent, acceptance, and delivery; and, by the French law, also registry. Civilians distinguish donation into pure and conditional. *Donatio pura* is when one gives a thing with an intention that it become immediately the property of the donee, never to revert to

the donor; and this from no other motive, than his generosity. *Donatio conditionalis* is when one gives a thing with an intention that it become the property of the donee, upon performing some condition stipulated.

**DONATISTS**, christian schismatics in Africa, who took their name from their leader Donatus. A secret hatred against Cæcilian, elected bishop of Carthage about the year 311, excited Donatus to form this sect. He accused Cæcilian of having delivered up the sacred books to the pagans, and pretended that his election was void, and all his adherents heretics. He taught that baptism administered by heretics was null, that every church but the African was become prostituted, and that he was to be the restorer of religion. Some accuse the donatists of arianism. Constantius and Honorius made laws for their banishment, and Theodosius and Honorius condemned them to grievous mulcts.

**DONATIVE**, a gratuity, or present made to any person.

Donative among the Romans was properly a gift made to the soldiers, as congiarium was that made to the people. See the article CONGIARIUM.

Salmasius says, the common and legitimate rate of a donative, was three pieces of gold per head; and Casaubon observes, that the legal donative was 20,000 denarii; and that it was not customary to give less, especially to the prætorian soldiers; that the centurions had double, and the tribunes, &c. more in proportion.

Donative, in the canon-law, is a benefice given by the patron to a priest, without presentation to the ordinary, and without institution or induction. The king may found a church or chapel, and exempt it from the jurisdiction of the ordinary. He may also by his letters patent grant licence to a common person to found such a church, and ordain it to be made donative. The resignation of a donative must be to the donor or patron, nor may the ordinary visit the same, but the patron by commissioners appointed by him. There can be no lapse of this benefice, though the bishop may compel such patron to nominate a clerk by ecclesiastical censures; and the clerk must be qualified as other clerks of churches are.

**DONAWERT**, a city of Bavaria in Germany, forty miles north-west of Ulm : east long.  $10^{\circ} 40'$  north lat.  $48^{\circ} 40'$ .

**DONAX**, in ichthyology, a name used by some for the solen. See the article **SOLE**N.

**DONAX**, in botany, the great reed. See the article **REED**.

**DONCASTER**, a market town of Yorkshire, thirty miles south of York. See the article **YORK**.

**DONEE**. See the article **DONOR**.

**DONJON**, in fortification, signifies a strong tower, or redoubt of a fortress, whither the garrison may retreat, in case of necessity, and capitulate with greater advantage.

**DONOR**, in law, the person who gives lands or tenements to another in tail, &c. as he to whom such lands, &c. are given is the donee.

**DONZY**, a town of France in the Orleanois : east long.  $3^{\circ} 16'$ , north lat.  $47^{\circ} 17'$ .

**DOOR**, in architecture, an aperture in a wall, to give entrance and exit into and out of a building, or any apartment thereof.

It is laid down as a rule, that the doors of an house be as few in number, and as moderate in dimensions, as possible ; as all openings are weakenings.

Secondly, that they do not approach too near the angles of the walls, it being a very great solecism to weaken that part which strengthens all the rest.

Thirdly, that the doors, if possible, be placed over one another, that void may be over void, and full over full, which circumstance will greatly strengthen the whole fabric.

Fourthly, that, if possible, they may be opposite to each other, in such a manner, that one may see from one end of the house to the other, which will not only be very graceful, but most convenient, in respect that it affords means of cooling the house in summer, by letting the air through it, and by keeping out the wind in winter, which way soever it fit.

Fifthly, 'tis not only ornamental, but very secure, to turn arches over doors, which will discharge them in great measure from the superincumbent weight.

The proportions of doors are adjusted by those of a man. In large buildings, they must be always larger than in smaller : but should not be less than six feet high in any, to admit a man of a just stature erect : and as the breadth of a man, with his arms placed akimbo, is

nearly subduple his height, the width ought never to be less than three feet. Some architects gives us these dimensions following : in small buildings, the breadth of the door four feet, or four and a half ; in middling buildings five, or six ; in large ones seven, or eight : in chambers of the first story three and a half, three and three-fourths, or four ; of the second, four, or four and a half ; and of the third, five, or six ; in churches seven or eight ; in gates, nine, ten, or twelve : hence their height is easily determined, except for the gates of cities, which should only be four-fifths of their breadth.

In plate LXXVI. fig. 5. are represented two doors, of which that marked N is two diameters high ; and that marked O,  $2 \frac{1}{2}$  diameters. Here the architrave being divided into three parts, two is for the breadth of the pilaster, as at P ; and on these pilasters are placed the trusses, scrolls, or corbels, as in Q ; whose shape is almost at pleasure. If either of these be used as frontispieces of external doors, the pediment ought not to be broken, or opened, and the architrave should stand on a plinth, equal to two thirds thereof, or to the height of the step, by which one ascends into the house.

**DORADO**, in ichthyology, the same with guaracapema. See **GUARACAPEMA**.

**DORCHESTER**, the capital of Dorsetshire, situated on the river Frome, six miles north of Weymouth : west long.  $2^{\circ} 35'$ , and north lat.  $50^{\circ} 40'$ .

It gives the title of marquis to the noble family of Pierpoint, dukes of Kingston, and sends two members to parliament.

**DORDONNE**, a river of France, which runs through the province of Guienne, and falls into the Garonne, twelve miles below Bourdeaux.

**DORDRECHT**, in geography. See **DORT**.

**DOREAS LYBICA**, in zoology, the same with the gazella. See **GAZELLA**.

**DOREE**, or **JOHN DOREE**, a fish called by authors faber. See the article **FABER**.

**DORIA**, in botany, the name by which some call a species of solidago. See the article **SOLIDAGO**.

**DORIC**, in general, any thing belonging to the Dorians, an antient people of Greece, inhabiting near mount Par-nassus.

**DORIC ORDER**, in architecture, the second of the five orders, being that between the tuscan and ionic. See the articles **ORDER**, **TUSCAN**, and **IONIC**.



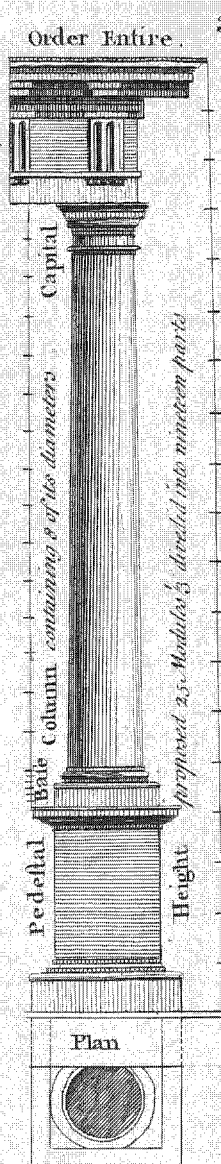


Fig. 1. DORIC - ORDER.

Corniche

Frieze

Architrave

Capital

Shaft

Base

Corniche

Dye

Base

Fig. 2. DOSSILS.

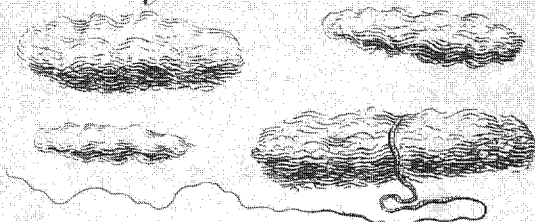
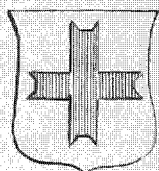


Fig. DOUBLE FICHE.



This order seems the most natural and best proportioned of all the orders, the several parts of it being founded on the natural position of solid bodies. Accordingly, the doric is the first, and most antient of the orders of architecture, and is that which gave the first idea or notion of regular building. See plate LXXVII, fig. 1.

It was indeed more simple at its first invention; than it is at present; and when they came in after times to adorn and enrich it more, the appellation of Doric was restrained to this richer manner, and then they called the primitive, simple manner, by the new name of Tuscan.

Some time after its invention, it was reduced to the proportions, strength and beauty of the body of a man: hence as the foot of a man was judged the sixth part of his height, they made the doric column six diameters high. After that, they added another diameter to it, and made it seven; which augmentation seemed to bring it nearer to the proportion of a man; the human foot, at least in our days, not being a sixth but nearly a seventh part of the body.

The characters of the doric order, as they are now managed, are, the height of its column, which is eight diameters; the frieze which is adorned with triglyphs, drops, and metopes; its capital, which is without volutes, and its admitting of cymatiums.

It has been already observed, that the antients had two dorics; the first of which was the more simple and massive, and was chiefly used in temples; the second, which was the more light and delicate, they used in porticoes and theatres.

The doric is used by the moderns, on account of its solidity, in large, strong buildings; as in the gates of cities and citadels; the outsidcs of churches, and other massy works, in which delicacy of ornaments would not be suitable.

The most considerable antient monuments of this order is the theatre of Marcellus at Rome, the capital, the height of the frieze, and projecture of which are much smaller than in the modern architecture.

Vignola adjusts the proportion of the doric order as follows: he divides the whole height of the order without the pedestal into twenty parts, or modules, one of which he allows to the base; fourteen to the shaft, or fust; one to the capital, and four to the entablature: the

several parts and members may be seen under their respective heads. See the articles COLUMN, CORNICHE, BASE, FRIEZE, &c.

*The DORIC order delineated by equal parts, instead of modules and minutes.* The height of the pedestal being two diameters, and  $\frac{1}{2}$ , is divided into 4, giving one to the base, whose plinth is  $\frac{2}{3}$  thereof; the other part is divided into seven, giving four to the torus, one to the fillet, and two to the hollow. The breadth of the base is a diameter and one third. The projection of the base is equal to its height, and the fillet has 4 of these parts. The height of the cornice is half the base, being  $\frac{1}{2}$  of the whole height; and is divided into nine, giving two to the hollow, one to the fillet, five to the corona, and one to the fillet: the projection of the hollow is three of these parts, of the corona six, and of the whole seven.

*Base of the column.* The height is half a diameter, and is divided into six, giving two to the plinth, 1 and  $\frac{1}{2}$  to the lower torus,  $\frac{1}{4}$  to the fillet, and one to the scotia,  $\frac{1}{4}$  to the fillet, and one to the upper torus. The fillet above the torus is equal to the others, and is part of the column. The projection is two of these parts, and one third thereof is for the upper fillet, and  $\frac{2}{3}$  to the upper torus; and the fillet, under it, is perpendicular to the center. For forming the scotia, divide its height into 3, and on the line that separates the one part above from the other two parts below, and perpendicular to the fillet, is the center for the first quarter sweep; and the same distance forwards, in the line, is the center for the other quarter, and is also the projecture of the lower fillet.

The diminishing of this column is  $\frac{1}{8}$  of the diameter. The height of the capital is half a diameter, and is divided into 9, giving three to the frieze of the capital, one to the fillets, which are three, and are equal; two to the oval, two to the abacus, and one to the ogee and fillet which is  $\frac{1}{3}$ . For the projections, the fillets have one of these parts, the abacus three, and the whole four.

The height of the architrave is  $\frac{1}{2}$  a diameter, and is divided into six parts, giving two to the first face, two to the second, one to the bells and fillet, which is one third, and one to the band at top: the projection is equal to the band.

The frieze is in height  $\frac{3}{4}$  of the diameter, and the triglyphs are in breadth  $\frac{1}{2}$  a diameter, which are divided into 6, giving 1 to each of the channels, and 1 to the spaces between the channels.

The projection from the naked of the frieze is  $\frac{3}{4}$  of a part; and the spaces, or metopes, between the triglyphs, ought to be equal to the height of the frieze.

The height of the cornice is  $\frac{3}{4}$  of the diameter, and is divided into 9, giving 1 to the cap of the triglyph, 1 to the hollow and fillet, which is  $\frac{1}{2}$ , 1 to the ovolo, 1 to the mutule and fillet under it, which is equal to the other;  $\frac{1}{2}$  part to the cap of the mutule and fillet, which is  $\frac{1}{3}$ , 1 and  $\frac{3}{4}$  to the corona,  $\frac{3}{4}$  to the cima reversa,  $\frac{1}{4}$  to the fillet, 1 and  $\frac{1}{4}$  to the cima recta, and  $\frac{1}{2}$  part to the fillet.

For the projections, the cap of the triglyph hath 1 of these parts, the hollow 1 and  $\frac{3}{4}$ , the ovolo 2 and  $\frac{3}{4}$ , the mutule 8 and  $\frac{3}{4}$ , the corona 9 and  $\frac{3}{4}$ , the cima reversa 10 and  $\frac{3}{4}$ , and the whole 12 parts.

**DORIC DIALECT**, in grammar, one of the five dialects, or manners of speaking which were principally in use among the Greeks.

It was first used by the Lacedemonians, particularly those of Argos; afterwards it passed into Epirus, Lybia, Sicily, and the islands of Rhodes, Crete, &c.

According to the doric dialect, the vowels  $\alpha$ ,  $\epsilon$ ,  $\sigma$ ,  $\omega$ , are changed into  $\alpha$ ; the diphthongs  $\epsilon\iota$  into  $\alpha$  or  $\alpha\iota$ ; and the consonants  $\beta$  into  $\gamma$ ;  $\zeta$  into  $\sigma\delta$ ;  $\kappa$  and  $\varsigma$  into  $\tau$ ;  $\tau$  and  $\rho$  into  $\kappa$ ;  $\lambda$  with a  $\tau$  or  $\theta$  following it, into  $\nu$ . Thus for  $\phi\eta\mu\eta$ ,  $\tau\rho\epsilon\chi\omega$ ,  $\kappa\lambda\epsilon\iota\delta\alpha$ ;  $\beta\lambda\epsilon\phi\alpha\rho\alpha$ , &c. they say  $\phi\alpha\mu\alpha$ ,  $\tau\rho\alpha\chi\omega$ ,  $\kappa\lambda\alpha\delta\alpha$ ,  $\gamma\lambda\epsilon\phi\alpha\rho\alpha$ , &c.

They likewise change  $\upsilon$  into  $\omega$ , as  $\lambda\omicron\gamma\omega$  for  $\lambda\upsilon\gamma\omega$ ; also  $\epsilon\theta$  into  $\epsilon\upsilon\varsigma$ , as  $\beta\alpha\sigma\iota\lambda\epsilon\upsilon\varsigma$  for  $\beta\alpha\sigma\iota\lambda\epsilon\theta$ ;  $\epsilon\alpha$ ,  $\alpha\epsilon$ , and  $\alpha\epsilon\iota$  into  $\eta$ , as  $\kappa\eta\eta\varsigma$  for  $\kappa\epsilon\epsilon\alpha\varsigma$ ,  $\epsilon\gamma\epsilon\lambda\eta\varsigma$  for  $\epsilon\gamma\epsilon\lambda\alpha\epsilon\varsigma$ , and  $\gamma\epsilon\lambda\eta\varsigma$  for  $\gamma\epsilon\lambda\alpha\epsilon\iota\varsigma$ : with other transmutations of the like nature.

**DORIC MODE**, in music, the first of the authentic modes of the antients; its character is to be severe, tempered with gravity and joy; and is proper upon religious occasions, as also to be used in war. It begins *D, la, sol, re*. Plato admires the music of the doric mode, and judges it proper to preserve good manners, as being masculine; and on this account allows it in his commonwealth. The antients had likewise their sub-doric or hypodoric mode, which was one of the plagal modes. Its character was to be

very grave and solemn: it began with *re*, a fourth lower than the doric.

**DORING**, or **DARING**, among sportsmen, a term used to express a method of taking larks by means of a clap-net and a looking-glass. See **CLAP-NET**.

**DORMANT**, in heraldry, is used for the posture of a lion, or any other beast, lying along in a sleeping attitude, with the head on the fore-paws; by which it is distinguished from the couchant, where though the beast be lying, yet he holds up his head.

**DORMANT-TREE**, in architecture, is a name given by workmen to a great beam lying across a house, commonly called a summer.

**DORMANT-TYLES**. See **TYLE**.

**DORMER**, in architecture, signifies a window made in the roof of an house, or above the entablature, being raised upon the rafters.

**DORMITORY**, a gallery in convents or religious houses, divided into several cells, in which the religious sleep or lodge.

**DORMITORY** is sometimes used for a burying place.

**DORONICIS AFFINIS**, a name given by Plukenet to a plant called by Linnæus *gerbera*. See the article **GERBERA**.

**DORONICUM**, **LEOPARD'S BANE**, in botany, a genus of the *Syngenesia-polygamia-superflua* class of plants, the compound flower of which is radiated: the proper flower is funnel-formed; there is no pericarpium, but the cup, being slightly connivent, contains a solitary seed, vertically ovated, compressed, fulcated, and crowned with a downy pap.

The root of the *doronicum officinarum* is said to be an alexipharmic, but it is not used in the present practice.

**DORPT**, or **DORPAT**, a city of Livonia, about fifty miles south of Narva: east lon.  $27^{\circ} 25'$ , and north lat.  $58^{\circ}$ .

**DORSAL**, an appellation given to whatever belongs to the back. See **DORSUM**.

**DORSAL MUSCLES** are the muscles of the back and loins, which are for the most part common: there are of the extensors usually reckoned three on each side, *viz.* the *sacro-lumbaris*, the *longissimus dorsi*, and the *femispinosus*: the flexors are three also, *viz.* the *quadratus lumborum*, the *psoas parvus*, and the *intertransversales lumborum*. See each under its proper head.

**DORSAL NERVES**. See **NERVE**.

**DORSIFEROUS PLANTS**, among botanists, such as are of the capillary kind, without

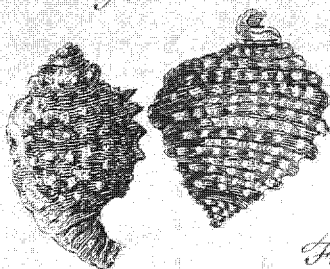
*Fig. 1. DODARTIA.*



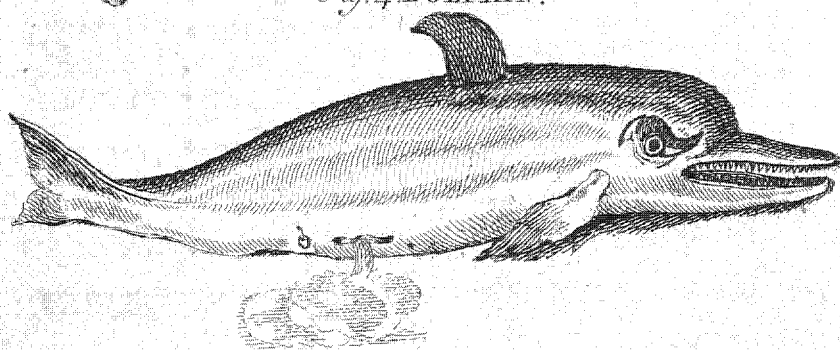
*Fig. 2. DODO.*



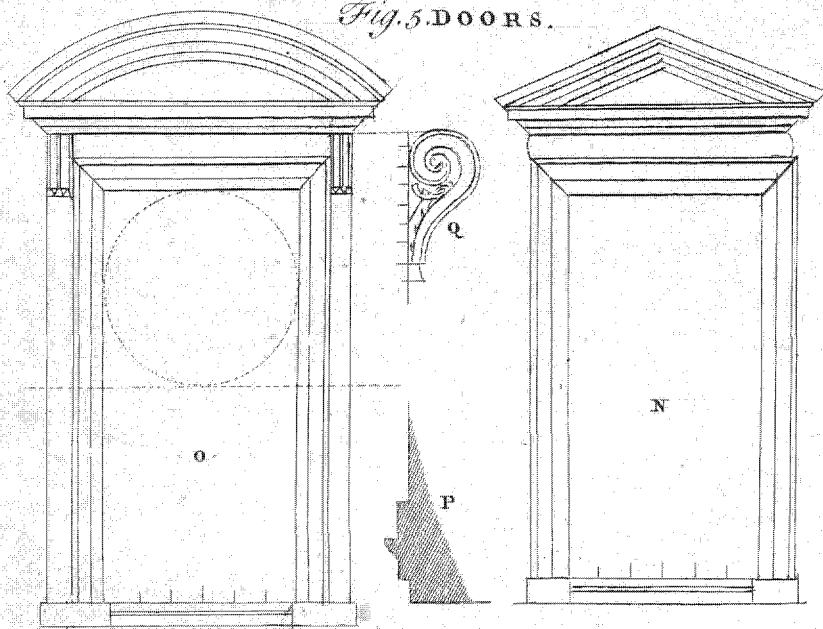
*Fig. 3. DOLIUM.*



*Fig. 4. DOLPHIN.*

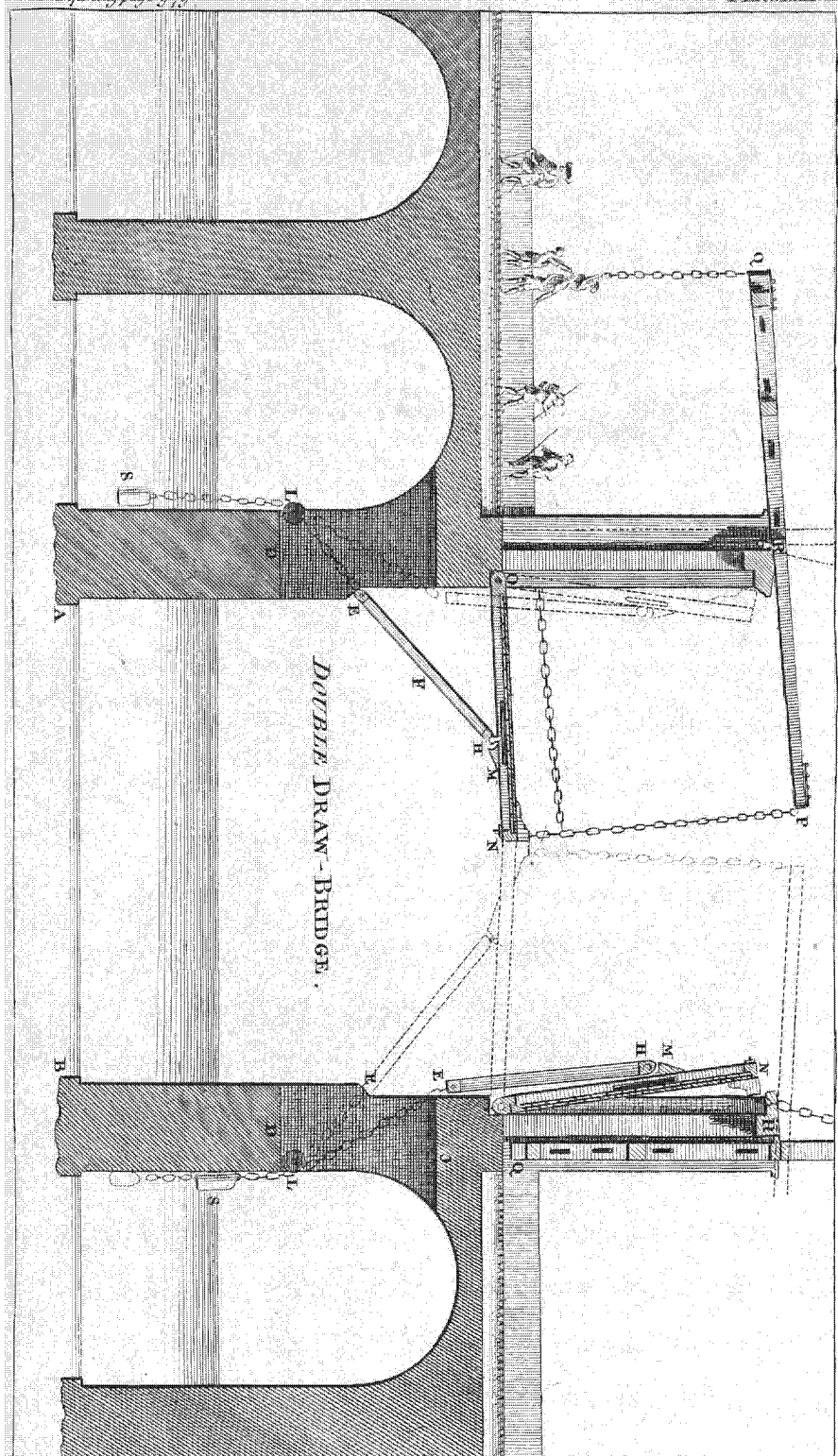


*Fig. 5. DOORS.*











without stalks, and which bear their seeds on the backside of their leaves.

**DORSTENIA**, in botany, a genus of the *tetrandria-monogynia* class of plants, which have no flower-petals, only a great many collections of the male and female parts on the disc; each collection, or partial flower, being surrounded by its proper perianthium, as the whole are by a common involucre or cup; the seeds, which are roundish and solitary, are contained in a common pulpy receptacle. See the article **CONTRAYERVA**.

**DORSUM**, BACK, in anatomy, comprehends all the posterior part of the trunk of the body, from the neck to the buttocks. The back is furnished with several muscles, which are common to it with the loins, as the *longissimus dorsi*, the *sacro-lumbaris*, and *semispinosus*; these are called extensors. See **EXTENSOR**.

To the back likewise belong the *intertransversales lumborum*, the *quadratus lumborum*, and the *psoas*. See the article **INTERTRANSVERSALIS**, &c.

Its bones are the *spina dorsi*, ribs, and os sacrum. See **SPINE**, **RIB**, &c.

**DORSUM** is also used to denote the upper side of the hand and foot, in contradistinction to the lower side, called the palm and sole. See **HAND** and **FOOT**.

**DORSUM NASI**, the ridge of the nose. See the article **NOSE**.

**DORT**, a city of the United Provinces, situated in that of Holland, on an island in the river *Maese*, about ten miles east of Rotterdam: east lon.  $4^{\circ} 40'$ , and north lat.  $51^{\circ} 47'$ .

**DORTMOND**, a city of Westphalia in Germany, about thirty miles north-east of Dusseldorp: east lon.  $6^{\circ} 50'$ , and north lat.  $51^{\circ} 25'$ .

It is an imperial city, and constitutes a sovereign state.

**DORTMANNIA**, the name of a plant comprehended by Linnæus among the *lobelia*. See the article **LOBELIA**.

**DORYCNium**, in botany, a genus of the *diadelphia-decandria* class of plants, the corolla of which is papilionaceous; the vexillum is vertically cordated and reflex; the alæ are oblong, of the length of the carina, which is short and straight; the fruit is a roundish, acuminate, bivalve, and unilocular pod, almost covered; the seed is either one or two.

**DORYPHORI**, in antiquity, an appellation given to the life-guard men of the roman emperors: they were held in such great estimation, as frequently to

have the command of armies conferred on them. It was likewise usual for the chief commanders, to have their *doryphori* to attend them.

**DOSE**, in medicine and pharmacy, the quantity of a medicine given at one time; or the proportion of which the several ingredients of a compound medicine bear to each other.

It is the business of the physician to adjust the doses of medicines to the cases of his patients; in doing which he cannot use too much caution, since the same dose that would prove highly beneficial to one, may be fatal to another. See **MEDICINE**, **PHARMACOPOEIA**, &c.

**DOSITHEANS**, *dosithei*, in church-history, a sect among the Hebrews, being one of the branches of the Samaritans. See the article **SAMARITANS**.

They abstained from eating any creature that had life, and were so superstitious in keeping the sabbath, that they remained in the same place and posture wherein that day surprised them, without stirring till the next day. They married but once, and a great number never married. Dositheus, their founder, being dissatisfied among the Jews, retired to the Samaritans, who were reputed heretics, and invented another sect; and to make it more authentic, he went into a cave, where, by too long abstinence, he killed himself. The name of dositheans was also given to some of the disciples of Simon Magus.

**DOSSER**, in military matters, a sort of basket, carried on the shoulders of men, used in carrying the overplus earth from one part of a fortification to another, where it is wanted.

**DOSSIL**, in surgery, lint made into a cylindric form, or resembling the shape of dates, or olive-stones, the size of which is very different. Dossils are used in dressing a disordered part; and are sometimes secured by a thread, tied round their middle. See plate **LXXVII**. fig. 2.

It requires a good deal of time and experience to acquire a proper expertness in making up these forms.

These different forms of scraped lint are used, 1. To stop the bleeding of fresh wounds; and in large wounds they should first be dipped in some styptic liquor, or sprinkled with a styptic powder. 2. To agglutinate and heal wounds, especially if spread with some digestive ointment, or dipped in some vulnerary liquor. 3. In drying up wounds and ulcers. 4.

In

In keeping the lips of wounds, at a proper distance, that they may not unite before the bottom is well digested and healed. 5. To preserve wounds from the injuries of the air.

The dossils tied round with a thread, are chiefly used in dressing deep wounds and ulcers, that none of it may be left in them.

**NOTE ASSIGNANDA**, in law, a writ that formerly lay for a widow, on its being found by office, that the king's tenant was seized of lands in fee or tail at the time of his death, and that he held of the king in chief, &c. in which case the widow was to come into the court of chancery, and there make oath that she would not marry without the king's leave; upon which she had this writ to the escheator, to assign her dower.

**NOTE UNDE NIHIL HABET**, a writ of dower which the widow may have against a person that bought land of her husband in his life-time, whereof he was seized in fee simple or fee tail, and of which she is dowerable.

*Resto de DOTE.* See the article **RECTO**.

**DOTIS ADMENSURATIONE**, admeasurement of dower. See **ADMEASUREMENT**.

**DOTTEREL**, the english name of a bird called by authors morinellus. See the article **MORINELLUS**.

**DOUAY**, a fortified city of the french Netherlands, situated on the river Scarpe, about fifteen miles south of Lille: east lon. 3°, and north lat. 50° 25'.

**DOUBLE ASPECT**, in painting. See the article **ASPECT**.

**DOUBLE BASTION**, in fortification. See the article **BASTION**.

**DOUBLE CAST**, in husbandry, a term used by the farmers for that method of sowing that does not dispense the necessary quantity of seed for a piece of land at one bout, but requires going over every place twice.

**DOUBLE DESCANT**, in music. See the article **DESCANT**.

**DOUBLE DIESIS**. See **DIESIS**.

**DOUBLE horizontal dial**, one with a double gnomon, one of which points out the hour on the outward circle, and the other shews the hour upon the stereographic projection drawn upon it. This dial not only finds the meridian, hour, &c. but shews the sun's place, rising and setting, declination, amplitude, altitude, and azimuth, with many other useful propositions. See the article **DIAL**.

**DOUBLE DANCETTE**, in heraldry. See the article **DANCETTE**.

**DOUBLE EXCENTRICITY**. See the article **EXCENTRICITY**.

**DOUBLE FEAST**. See **FEAST**.

**DOUBLE FEVER**. See the article **FEVER**.

**DOUBLE FICHY, or FICHE**, in heraldry, the denomination of a cross, when the extremity has two points, in contradistinction to *fiché*, where the extremity is sharpened away to one point. See plate LXXVII. fig. 3.

**DOUBLE FINE**, in law. See **FINE**.

**DOUBLE FUGUE**, in music. See **FUGUE**.

**DOUBLE LETTER**, in grammar, a letter which has the force and effect of two. The Greeks have three of these, viz. *Ξ, Ψ, Ω*; the Latins have two *X* and *Z*; and most of the modern languages have the same.

**DOUBLE MEASURE**. See **MEASURE**.

**DOUBLE PEDESTAL**. See **PEDESTAL**.

**DOUBLE PLEA**, in law, is where the defendant in a suit alleges two several matters in bar of the plaintiff's action, when one of them is sufficient. This is not admitted in common law. Thus when a person pleads several things, the one having no dependance upon the other, such plea is accounted double, and will not be admitted; but where the things pleaded mutually depend on each other, and the party cannot have the last plea without the first, there the whole shall be received.

**DOUBLE PLOUGH**. See **PLOUGH**.

**DOUBLE POINT**, in the higher geometry. See *CURVES of the second order*.

**DOUBLE POSITION**. See **POSITION**.

**DOUBLE QUARREL**, a complaint made by any clerk, or other, to the archbishop of a province, against an inferior ordinary, for delaying justice in some spiritual cause, as to give sentence, institute a clerk, or the like. It seems to be termed double quarrel, because the complaint is usually made both against the judge, and the party at whose suit justice is delayed.

<b>DOUBLE RATIO,</b>	} See {	<b>DUPLE.</b>
<b>DOUBLE ROADS,</b>		<b>ROADS.</b>
<b>DOUBLE TENAILLE,</b>		<b>TENAILLE</b>
<b>DOUBLE TIME,</b>		<b>TIME.</b>
<b>DOUBLE VAULT,</b>		<b>VAULT.</b>

**DOUBLE VESSEL**, in chemistry, is when the neck of one bolt-head or matrafs is put and well luted into the neck of another, in order to refine and exalt spirits as high as can be. It is sometimes called a pelican, and also a diota.

*Grafting by DOUBLE incision.* See the article **GRAFTING**.

*Recovery with DOUBLE voucher.* See the article **RECOVERY**.

**DOUBLES**, in our statutes, signify as much as letters patent.

**DOUBLETS**, a game on dice within tables : the men, which are only fifteen, being placed thus ; upon the six, cinque, and quater points, there stand three men a-piece ; and upon the trey, duce, and ace, only two. He that throws highest hath the benefit of throwing first ; and what he throws he lays down, and so doth the other : what the one throws, and hath not, the other lays down for him, but to his own account ; and thus they do till all the men are down, and then they bear. He that is down first bears first, and will doubtless win the game, if the other throws not doublets to overtake him ; which he is sure to do, since he advances or bears as many as the doublets make, viz. eight for two fours.

**DOUBLING**, in the military art, is the putting two ranks or files of soldiers into one. Thus, when the word of command is, *double your ranks*, the second, fourth, and sixth ranks march into the first, third, and fifth, so that the six ranks are reduced to three, and the intervals between the ranks become double what they were before. *To double by half files*, is when the fourth, fifth, and sixth ranks march up to double the first, second, and third, or the contrary. *To double the files to the right*, is when every other file faces to the right, and marches into the next file to it, so that the six ranks are turned into twelve, and every file is twelve deep. *To double the files to the left*, is when every other file faces to the left, and marches into the next. In doubling the files, the distance betwixt the files becomes double.

**DOUBLING**, among hunters, who say that a hare doubles, when she keeps in plain fields, and winds about to deceive the hounds.

**DOUBLING**, in the manege, a term used of a horse, who is said to double his reins, when he leaps several times together, to throw his rider : thus we say, the ramingue doubles his reins, and makes pontlevis. See the articles **RAMINGUE** and **PONTLEVIS**.

**DOUBLING a cape or point**, in navigation, signifies the coming up with it, passing by it, and leaving it behind the ship.

**DOUBLINGS**, in heraldry, the linings of robes and mantles of state, or of the mantlings in achievements.

**DOUBLON**, or **DUBLOON**, a spanish and portuguese coin, being the double of a pistole. See **COIN** and **PISTOLE**.

**DOUBTING**, *dubitatio*, the act of withholding our assent from any proposition, on suspicion that we are not thoroughly apprised of the merits thereof ; or from not being able peremptorily to decide between the reasons for and against it.

Doubting is distinguished by the schoolmen into two kinds, *dubitatio sterilis*, and *dubitatio efficax* : the former is that where no determination ensues ; in this manner the sceptics and academics doubt, who withhold their assent from every thing. See the articles **SCEPTICS**, &c.

The latter is followed by judgment, which distinguishes truth from falsehood : such is the doubting of the peripatetics and cartesianians ; the last in particular are perpetually inculcating the deceitfulness of our senses, and tell us that we are to doubt of every one of their reports, till they have been examined and confirmed by reason. On the other hand, the epicureans teach that our senses always tell truth, and that, if you go ever so little from them, you come within the province of doubting. See the articles **CARTESIANS**, **EPICUREANS**, &c.

**DOUBTING** in rhetoric, signifies the debate of the mind with itself, upon a pressing difficulty. It is, for the most, part expressed by interrogation, though that is not necessary. Thus Cicero for Roscius : " Quid primum querar ? aut unde potissimum, iudices, ordear ? aut quod, aut a quibus, auxilium petam ? deorum immortalium ? populine romani ? " &c. This figure keeps us in eager attention.

**DOUCINE**, in architecture, a moulding concave above and convex below, serving commonly as a cymatium to a delicate corniche. It is likewise called *gula*. See **CYMATIUM** and **GULA**.

**DOUCKER**, or **DUCKER**. See **DUCKER**.  
**DOVE**, *columba*, in ornithology. See the article **COLUMBA**.

**DOVE**, in geography, the name of a river dividing Derbyshire from Staffordshire : also of a town of the Orleanois, in France, about twenty miles south-east of Angers.

**DOVE-TAILING**, in carpentry, is the manner of fastening boards together by letting one piece into another, in the form of the tail of a dove. The dove-tail is the strongest of the assemblages or jointings, because

because the tenon, or piece of wood which is put into the other, goes widening to the extreme, so that it cannot be drawn out again, by reason the extreme or tip is bigger than the hole.

The French call it *queue d'aronde*; which name is also used by the English in fortification.

**DOVELLA**, in ichthyology, a species of labrus with two large teeth in the upper jaw. See the article **LABRUS**.

**DOVER**, a borough and port-town of Kent, situated on a rock, opposite to Calais in France, with a strong castle: east lon.  $25^{\circ}$ , and north lat.  $51^{\circ} 10'$ .

Dover gives the title of duke to the dukes of Queensbury, a branch of the noble family of Douglas; and sends two members to parliament, styled barons of the cinque ports, whereof Dover is the chief. See the article **CINQUEPORTS**.

**DOUGLAS**, a port-town, and the best harbour in the Isle of Man: west long.  $4^{\circ} 25'$ , and north latitude  $54^{\circ} 7'$ .

**DOULEIA**, in grecian antiquity, a kind of punishment among the Athenians, by which the criminal was reduced to the condition of a slave.

It never was inflicted but upon the *αἰσχροί*, sojourners, and freed servants.

**DOURLACH**, or **DURLACH**. See the article **DURLACH**.

**DOWAGER**, *doïssa*, a widow endowed, is a title applied to the widows of princes, dukes, earls, and persons of high rank only.

**DOWER**, that portion which the law allows a widow out of the lands of her husband, after his decease. It is distinguished into five kinds: 1. Dower by the common law, is a third part of such lands and tenements as the husband was solely seized in fee or tail, during the coverture, and this the widow is to enjoy during her life. 2. Dower by custom, that part of the husband's estate to which the widow is intitled, after the death of her husband, by the custom of some manor, so long as she shall live single and chaste: this is sometimes more than one third part, for in some places she has half the land, and in others the whole, during life. See the article *Free BENCH*. 3. Dower ad ostium ecclesie, formerly made by the husband immediately after the marriage, when the particular lands were expressly named, of which his wife should be endowed. 4. Dower ex assensu patris, made of lands named by a son who was husband with the consent of his father; and this was

always reduced into writing, as soon as the son was married. 5. Dower de la plus belle, which was where the wife was endowed with the fairest part of the husband's estate. Of these five the two first only of these writs of dower are now in use.

*Admeasurement of DOWER*. See the article **ADMEASUREMENT**.

*Assignment of DOWER*, the setting out a woman's marriage-portion by the heir.

*Tenant in DOWER*. See **TENANT**.

**DOWLE-STONES**, in our old writers, the same with land-marks.

**DOWN**, in geography, the capital of a county of the same name in the province of Ulster, in Ireland: west longit.  $5^{\circ} 50'$ , and north lat.  $54^{\circ} 23'$ .

**DOWNETON**, or **DUNKTON**, a borough-town of Wiltshire, five miles south of Salisbury.

It sends two members to parliament.

**DOWNHAM**, a market-town of Norfolk, ten miles south of Lynn, famous for its good butter; there being a thousand, and sometimes two thousand firkins bought here every Monday, and sent up the river Ouse to Cambridge, from whence it is conveyed to London, in the Cambridge waggons.

**DOWNS**, a famous road near Deal, in Kent, where both the outward and homeward bound ships frequently make some stay; and squadrons of men of war rendezvous in time of war.

It affords excellent anchorage, and is defended by the castles of Deal, Dover, and Sandwich.

**DOWRY**, *dos*, is properly the money or fortune which the wife brings her husband in marriage: it is otherwise called *maritagium*, marriage-goods, and differs from dower. See the article **DOWER**.

Among the Germans it was customary, in former times, for the husband to bring a dowry to his wife.

**DOWRY** is also used, in a monastic sense, for a sum of money given along with a maid, upon entering her in some religious order.

In France, the dowry of persons entering a monastery, to make profession of a religious life, is limited by law. That given upon entering a monastery of carmelites, urselines, and others not regularly founded, but established since the year 1600, by letters patent, must not exceed the sum of 8000 livres in towns where parliaments are held; nor 6000, in other places.

**DOXOLOGY**, an hymn used in praise of the Almighty, distinguished by the title of greater and lesser.

The lesser doxology was antiently only a single sentence, without response, running in these words, *glory be to the Father, and to the Son, and to the Holy Ghost, world without end, amen.* Part of the latter clause *as it was in the beginning, is now, and ever shall be*, was inserted some time after the first composition. Some read this antient hymn, *glory be to the Father, and to the Son with the Holy Ghost.* Others, *glory be to the Father in or by the Son, and by the Holy Ghost.* This difference of expression occasioned no disputes in the church, till the rise of the arian here; but when the followers of Arius began to make use of the latter, as a distinguishing character of their party, it was intirely laid aside by the catholics, and the use of it was enough to bring any one under suspicion of heterodoxy. The doxology was used at the close of every solemn office. The western church repeated it at the end of every psalm, and the eastern church at the end of the last psalm. Many of their prayers were also concluded with it, particularly the solemn thanksgiving, or consecration prayer at the eucharist. It was also the ordinary conclusion of their sermons.

The greater doxology, or angelical hymn, was likewise of great note in the antient church. It began with these words, which the angels sung at our Saviour's birth, *glory be to God on high, &c.* It was chiefly used in the communion service, and in men's private devotions. In the mozarabic liturgy, it is appointed to be sung before the lessons on christmas day; and St. Chrysostom observes, that the ascetics met together daily to sing this hymn. Both the doxologies have a place in the church of England, the former being repeated after every psalm, and the latter used in the communion service.

**DOZEINERS.** See **DECENNIERS.**

**DRABA**, **ARABIAN MUSTARD**, or **TURKY CRESSES**, in botany, a genus of the *tetradynamia-siliculosa* class of plants, the flower of which consists of four oblong petals, and is cruciform: it has six stamina, four whereof are longer than the other two: the fruit is a bilocular, elliptico-oblong, compressed pod, containing a number of small roundish seeds, and wanting a style.

**DRABLER**, in the sea-language, a small sail in a ship, being the same to a bonnet

that a bonnet is to a course, and is only used when the course and bonnet are too shoal to cloath the mast. See **COURSE** and **BONNET.**

**DRABS**, in the salt-works, a kind of wooden boxes for holding the salt when taken out of the boiling pan, the bottoms of which are made shelving or inclining forwards, that the briny moisture of the salt may drain off. See the article **SALT.**

**DRACHM**, a grecian coin of the value of seven-pence three-farthings. See **COIN.**

**DRACO**, the **DRAGON**, in zoology. See the article **DRAGON:**

**DRACO MARINUS**, the **SEA-DRAGON**, in ichthyology, the same with the araneus of Pliny: it is a species of trachinus, growing to six or eight inches in length, and called by some the weaver. See plate **LXXIX.** fig. 1.

**DRACO VOLANS**, in meteorology, a fiery exhalation, frequent in marshy and cold countries.

It is most common in summer, and tho' principally seen playing near the banks of rivers, or in boggy places, yet sometimes mounts up to a considerable height in the air, to the no small terror of the amazed beholders; its appearance being that of an oblong, sometimes roundish, fiery body, with a long tail. It is entirely harmless, frequently sticking to the hands and cloaths of people without injuring them in the least.

**DRACO**, in astronomy, a constellation of the northern hemisphere, said by different authors to contain 31, 32, 33, or even 49 stars.

**DRACOCEPHALUM**, **DRAGON'S HEAD**, in botany, a genus of the *dodynamia-gymnospermia* class of plants, the corolla of which consists of a single ringent petal; the tube is of the length of the cup; the upper lip is fornicated and obtuse, the lower is lightly divided into three segments; there is no pericarpium, but the cup cherishes the seeds, which are four ovato-oblong, and three sided ones. See plate **LXXIX.** fig. 3.

**DRACOCEPHALUS**, the same with **dracocephalum.** See the preceding article.

**DRACONARIUS**, in antiquity, the person who carried the standards called dragons, from the figures of these animals painted on them. These were in use among the Persians, Parthians, Scythians, Romans, &c.

**DRACONIS CAPUT, CAUDA, &c.** See the article **DRAGON.**

**DRACONTEAS**, a name used by the ancients for two distinct plants, *dracunculus* and *arum*. See **DRACUNCULUS** and **ARUM**.

**DRACONTIC MONTH**, the time of one revolution of the moon, from her ascending node, called *caput draconis*, to her return thither.

**DRACONTIUM**, **DRAGONS**, in botany, a genus of the *gynandria-polyandria* class of plants, the corolla of which consists of five concave, ovated, obtuse, and almost equal petals: the fruit is a single roundish berry; and the seeds are numerous.

Its root is esteemed a good alexipharmic and sudorific, and accordingly prescribed in the plague and malignant fevers, and for the bites of serpents.

**DRACUNCULI**, in medicine, small long worms, which breed in the muscular parts of the arms and legs, called Guinea-worms.

This distemper is very common in Guinea, and principally among the natives: Kempfer found it so also at Ormuz, upon the persian gulph, and likewise in Tartary. Dr. Tawne, in his treatise of the diseases of the West-Indies, informs us, that this distemper is not so frequent any where as on the Gold coast, at Anamboe, and Cormantyn.

The worm is white, round, and uniform, very much resembling white, round tape, or bobbing. It is lodged between the interstices and membranes of the muscles, where it insinuates itself sometimes exceeding five ells in length. It occasions no great pain at the beginning, but at such times as it is ready to make its exit, the part adjoining to the extremity of the worm, where it attempts its exclusion, begins to swell, throb, and be inflamed: this generally happens about the ankle, leg, or thigh, and rarely higher.

The countries where this distemper is observed, are very hot and sultry, liable to great droughts, and the inhabitants make use of stagnating and corrupted water, in which it is very probable that the ova of these animalcula may be contained; for the white people who drink this water, are obnoxious to the disease as well as the negroes.

The surgeons seldom attempt to extract this worm by making an incision; but as soon as they perceive the tumor rise to a competent bulk, they endeavour to bring it to a suppuration, with all convenient expedition; and then the head of the worm discovers itself, which they secure,

by tying it to a bit of stick, or cotton, that it may not draw itself up again: thus they continue to roll it round the stick, sometimes one inch, sometimes two or more, each day, taking great care not to break the worm, else it will be very difficult to recover the end of it again; and an abscess will be formed, not only at the suppurated part, but likewise through the whole winding of the muscles, where the dead putrifying worm remains, which generally occasions very obstinate ulcers. During the extraction of the worm, the patient should be plied with bitter aloetic and other anthelmintic medicines, in order to dislodge the worm the sooner from his tenement. When the worm is totally extracted, the remaining ulcer may be treated in the same manner as other common ulcers; nor does any farther inconvenience remain in the parts of which it had possession. This disease, simply considered, very rarely, if ever, proves mortal.

**DRACUNCULI** is also used for a disease in children, arising from little worms called by that name. See the article **WORMS**.

**DRACUNCULOIDES**, in botany, the name by which Boerhaave calls the *hæmanthus* of Linnaeus.

**DRACUNCULUS**, **DRAGONS**, in botany, is comprehended by Linnaeus among the *arums*. See the article **ARUM**.

**DRACUNCULUS** is also the name of the linear-leaved *artemisia*, called in english tarragon. See the article **TARRAGON**.

**DRACUNCULUS**, the little **SEA-DRAGON**, in ichthyology, a species of *cottus*, with the second back-fin white. See the article **COTTUS**.

The *dracunculus* is a very singular fish, growing to five or six inches in length. See plate **LXXIX**. fig. 2.

**DRAGANT**, the same with *tragacanth*. See the article **TRAGACANTH**.

**DRAGOMAN**, **DROGMAN**, or **DRUGGERMAN**, a name given in the Levant to the interpreters kept by the ambassadors of christian nations, residing at the Porte, to assist them in treating of their master's affairs.

**DRAGON**, *draco*, in zoology, an animal called also the flying lizard, being furnished with two lateral, membranaceous, and radiated wings: it is a true lizard, with a naked and four-legged body, and a long tail; though there are not wanting some who deny the existence of any such animal. See plate **LXXX**. fig. 2.

**Sea-DRAGON**. See **DRACO MARINUS**, and **DRACUNCULUS**, *supra*.

**DRAGON'S**



**DRAGON'S BELLY**, in astronomy. See the article **VENTER DRACONIS**.

**DRAGON'S BLOOD**, *sanguis draconis*, in pharmacy, a moderately heavy resin, of which there are two kinds : the one firm and compact, brought to us in lumps, of an inch long, or more, and about half an inch in diameter : these are wrapped up in certain long and narrow leaves, and are called the drops, or tears, of dragon's blood. The other is brought to us in larger masses or cakes, of an irregular figure. This is less compact than the former, and less pure : it is called the common dragon's blood, and is greatly inferior to the former in value. Besides these two common kinds, we sometimes meet with a third, which is soft, and will take an impression from the finger ; but we are to avoid a counterfeit sort of dragon's blood that is sometimes offered to sale, and is made up of several different resinous matters, coloured with the dragon's blood, or with brasil-wood : this is of no value. The dragon's blood in drops, is to be preferred to any other : the genuine dragon's blood is the fruit of a tall tree of the palm-kind, common in the island of Java, and some other parts of the East-Indies. It is a very powerful astringent, inebriant, and drier. It is given in diarrhoeas, dysenteries, and hæmorrhages of all kinds ; and, externally, in drying and healing ulcers. Its dose is from five grains to twenty-five.

**DRAGON-FLY**, the english name of the libella. See the article **LIBELLA**.

**DRAGON'S HEAD AND TAIL**, the two nodes of the moon. See the article **NODE**.

**DRAGON-SHELL**, the english name of a species of concamerated patella, with its rostrum very much bent. See the article **PATELLA**.

**DRAGON-TREE**, a term used by some for the palm-tree.

**DRAGONS**, in botany. See the article **DRA-CUNCULUS**, *supra*.

**Wild DRAGONS**, the same with tarragon. See the article **TARRAGON**.

**DRAGONNE'E**, in heraldry ; a lion dragonnée is where the upper half resembles a lion, the other half going off like the hinder part of a dragon. The same may be said of any other beast as well as a lion.

**DRAGOON**, in military affairs, a musqueteer, mounted on horseback, who sometimes fights or marches on foot, as occasion requires.

Dragoons are divided into brigades, as

the cavalry, and each regiment into troops ; each troop having a captain, lieutenant, cornet, quarter-master, two sergeants, three corporals, and two drums. Some regiments have hautboys : they are very useful on any expedition that requires dispatch, for they can keep pace with the cavalry, and do the duty of infantry : they encamp generally on the wings of the army, or at the passes leading to the camp ; and sometimes they are brought to cover the general's quarters : they do duty on the generals of horse and dragoons, and march in the front and rear of the army.

**DRAGOON**, in ornithology, the name of a small kind of carrier-pigeon, called *columba tabellaria minima*, by Moore. It is a bastard breed between the two species of pigeons called the horseman and the tumbler. They are very good breeders, and as they are lighter than the horseman, they are supposed more expeditious in flight, for a few miles : but the horseman outdoes them at greater lengths.

**DRAGS**, in the sea-language, are whatever hangs over the ship in the sea, as shirts, coats, or the like ; and boats, when towed, or whatever else that, after this manner, may hinder the ship's way when she sails, are called drags.

**DRAINING of lands**, the freeing them from an over abundance of water, by means of drains. See the next article.

**DRAINS**, a name given, in the fen-countries, to certain large cuts or ditches, of twenty, thirty, nay, sometimes forty foot wide, carried, through the marshy ground, to some river, or other place, capable of discharging the water they carry out of the fen-lands.

The best way is to begin the drain at the lowest place, and so to carry it into the bog towards the spring-head ; where it will be proper to make cross trenches, in order to drain it thoroughly. If the drains are deep, so that there is danger of cattle falling into them, they may be partly filled with stones, brick-bats, and the like ; and covered with wood, flags, turf, &c. and the water will drain away through the stones. When the drains are left open, the earth should not be laid in heaps by their sides, as is too often done ; but spread over the low places near them, or even carried off in carts. See the articles **DITCH** and **FEN**.

Most of these drains are made in our fen-countries by a body of men called the undertakers, whose reward is one third

of the ground they drain: they erect sluices also at a great expence, often not less than two thousand pounds each; yet these, with all the care they employ in erecting them, are subject to be blown up by the vast weight of water that lies on them when the lands are overflowed: some of these sluices have two or more pair of doors, of six, eight, or ten feet high, which shut, when the water in the river is higher than in the drains, by the weight and force of it, and so, *e contra*, throw out a body of eight feet square of water, for about six or seven hours, during the ebb. The real use of these drains is very evident from the visible improvement of the lands where they have been cut. The inhabitants of Essex have a particular way of draining lands in such grounds as lie below the high-water and somewhat above the low-water mark, and have land floods or fleets running through them, which make a kind of small creek. When these grounds are first enclosed from the sea, it is done with a bank raised from one side of the land designed to be taken in to the other, except a space left where the creek or land-floods run into the sea. When they begin to stop this, it is done at once, with a strong firm head; only according to the quantity of water to be vented, they lay therein several square troughs, composed of four large planks, of the same length that they design the thickne's of the head to be; and towards the sea is fitted a small door, which opens when the fresh water bears out on it, and shuts when the salt water rises, as already described.

**DRAKE**, in ornithology, the male of the duck-kind. See **ANAS** and **DUCK**.

**DRAMS** are accounted a kind of cordials. See **CORDIALS**, **BRANDY**, **RUM**, &c.

**DRAM**, or **DRACHM**, in commerce, a small weight. See **DRACHM** and **WEIGHT**.

**DRAMA**, a poem containing some certain action, and representing a true picture of human life, for the delight and improvement of mankind.

The principal species of the drama are two, comedy and tragedy. Some others there are of less note, as pastoral, satire, tragi-comedy, opera, &c. See the articles **TRAGEDY**, **COMEDY**, &c.

The primary parts of the drama, as divided by the antients, are the protasis, epistasis, catastasis, and catastrophe. The secondary parts are the acts and scenes. The accessory parts are the prologue, chorus, mimus, and epilogue, which

pointed out the use of the piece, or conveyed some other notice to the audience in the poet's name. See **PROTASIS**, **PROLOGUE**, **CHORUS**, &c.

The drama, says Vossius, owes its rise to the days of festivity; for in antient times, it was usual for men, when they gathered in the fruits of the earth, to meet together that they might sacrifice to the deity, and unbend their minds from the fatigues of the harvest. Hence arose two sorts of poetry, the one grave, in praise of the gods, the other jocose and full of lampoon, against one another. Thus, from the former arose tragedy, and from the latter, satire, comedy, and mimicry.

The drama, in some circumstances, is superior to epic poetry, particularly in action; for in the drama, the persons themselves are introduced, every thing is transacted in our sight, and our eyes and ears at once are gratified. Besides, the action in the drama, is much more compendious than in the epic; it takes up less time, and therefore requires more art to conduct it. It excites in the mind more rapid commotions, and consequently makes the pleasure and admiration more intense. For which reasons, Aristotle gives the preference to the drama; not that he reckons it more noble in general than the epic, for that would be contrary to truth and reason, but only as far as its sphere extends.

According to the Abbe du Bos, tragic poets ought to place their scenes in times remote from that in which they live; but that comedy, on the contrary, ought to be fixed in the very places and times in which it is represented; its design being to make us laugh at the expence of ridiculous persons, in order to purge us of those faults it exposes. Now we cannot distinguish nature so easily, when she appears in strange customs, manners, and apparel, as when she is clad, as it were, after our own fashion; whereas we always distinguish human nature in the heroes of tragedies, whether their scenes be at Rome or Sparta, by reason only great virtues or great vices are there represented. The dramatic poetry of the Romans, was at first divided into three sorts, tragedy, satire, and comedy; which were afterwards subdivided into several species. They had two species of tragedies, *viz.* the *tragœdiæ palliatæ*, in which the personages, manners, and dress were entirely greek; and the *tragœdiæ prætextatæ*, or *prætextæ*, wherein the person-

ages and manners were roman. The satire was a kind of pastoral poetry, which some authors assert to have held a kind of middle rank between tragedy and comedy; which is almost all we know of it. Comedy, in like manner as tragedy, was divided first into two species, *viz.* the greek, or palliata; and the roman, or togata, by reason of the introducing plain citizens into the latter, whose dress was called toga. The roman comedy was again subdivided into four species; the togata, properly so called, the tabernaria, the attellana, and the mimus. Pieces of the first sort were very serious, and admitted even of persons of distinction, for which reason they were sometimes called *prætextatæ*. The second were comedies of a less serious nature, and took their name from taberna; which strictly signified a place of rendezvous, proper for assembling persons of different conditions, whose characters were played off in those pieces. The attellana was a kind of piece very like the italian comedies; that is, those whose dialogues are not written. The actor, therefore, of the attellanæ, performed his part just as he pleased. The mimus resembled our farces, and the actors thereof performed always bare-foot: whereas, in tragedy, they wore a sort of shoe, or boot, called *cothurnus*; and, in the other species of comedy, another kind called *soccus*.

For the laws of the drama, see the articles UNITY, ACTION, CHARACTER, FABLE, &c.

**DRAMATIC**, in poetry, an epithet given to pieces written for the stage. See the article **DRAMA**.

**Stilo-DRAMATICO**, in the italian music. See the article **STYLE**.

**DRANK**, among farmers, a term used to denote wild oats, which never fail to infest worn-out lands; so that when plowed lands run to these weeds and thistles, the farmer knows it is high time to fallow them, or else to sow them with hay-feed, and make pasture of them.

Some, indeed, destroy the drank, by sowing the lands with beans, and letting loose sheep upon them when young. This must be done in dry weather, and the sheep eat up the drank and other weeds, without touching the beans.

**DRAPERY**, in sculpture and painting, signifies the representation of the clothing of human figures, and also hangings, tapestry, curtains, and most other things that are not carnations or landscapes.

The art of drapery consists, 1. In the order of the folds or plaits, which ought to be so managed, that you may easily perceive what it is they cover, and distinguish it from any thing else. Again, the folds ought to be large, as breaking and dividing the sight the less; and there should be a contrast between them, otherwise the drapery will be stiff. 2. In the quality of the stuffs; for some make their folds abrupt and harsh, others more soft and easy: the surface of some have a lustre, others are flat and dead; some are fine and transparent, others firm and solid. 3. In the variety of colours, which, when well managed, makes the greatest beauty of painting; all not being equally amicable and friendly with respect to each other, and some never to be placed near certain others.

M. De Piles observes, that drapery must never be made to adhere to the parts of the body; that a great motion and lightness of the drapery are only proper in figures in great agitation, or exposed to the wind; and that the nudities of the figures should always be designed, before the painter proceeds to the draperies.

Observe the following directions. Draw the out-lines of garments lightly, beginning with the great folds, which you may afterwards stroke into lesser; but be sure they cross not one another. Make the drapery bend with the body, according as it stands in or out, straight or crooked, or turns one way or another; observing that the closer the garment sits on the body, the narrower and smaller must the folds be. All the folds must consist of two lines, and no more, which you may turn with the garment at pleasure, shadowing the inner deep, and the outermost more light; and if the folds be never so curiously contrived, spare not to shadow them, if they fall inward from the light, with a double or triple shadow, as the occasion requires. The out-lines must be continued through the whole garment; the lesser you may break off and shorten as you please. The shades in silk and fine linnen, require little folds, and a light and rare shadow; and so also fine drapery requires more and sharper folds than coarse. Observe the motion of the wind and air for drawing loose apparel all one way; and examine the nature and disposition of light, especially as it has relation to the sun or any bright body. Moreover, the plaits and folds

fold must have their motions according as they are managed by the wearer, as under the arm, and under the knee, by opening and stretching out the arm and leg, making always hard, stiff, and gross folds, that by their appearance the nature and quality of the garment may be known, &c. But mean motions, such as appear in the folds of stuff and other cloths of fine wool, may become pliable to a person's limbs, and so made not only into sweet and pleasant folds, but may follow the bare flesh very well, falling plially about the loins or any other part. In other kinds of mixt motions, called turnings or crossings, which are proper unto damasks, cloths of gold, &c. the folds crossing and breaking one another, appear from the various qualities of the drapery, and must be so performed, as not to favour of an over-affected imitation, without grace or order.

**DRASTIC**, in physic, an epithet bestowed on such medicines as are of present efficacy, and potent in operations; and is commonly applied to emetics and cathartics.

**DRAVE**, a large navigable river, which, taking its rise in the archbishopric of Saltzburg, in Germany, runs south-east through Stiria; and continuing its course, divides Hungary from Sclavonia, and falls into the Danube at Esseck.

**DRAUGHT**, or **DRAFT**, in architecture, the figure of an intended building, described on paper, in which is laid down, by scale and compasses, the several divisions and partitions of the apartments, rooms, doors, passages, &c. in their due proportion to the whole building.

It is customary, and also exceedingly convenient, for any person, before he begins to erect a building, to have designs or draughts drawn upon paper or vellum, wherein the ichnography or ground-plot of every floor or story is delineated; as also the form or fashion of each front, with the windows, doors, ornaments, in an orthography, or upright. Sometimes the several fronts, &c. are taken and represented in the same draught, to shew the effect of the whole building, which is called scenography, or perspective. See the article **SCENOGRAPHY**.

**DRAUGHT-COMPASSES**, are such as have moveable points, to draw fine draughts in architecture. See **COMPASSES**.

**DRAUGHT**, in medicine. See **POTION**.

**DRAUGHT**, in painting. See the articles **DESIGN** and **DRAWING**.

**DRAUGHT**, in trade, called also **CLOFF** or **CLOUGH**, is a small allowance on weighable goods, made by the king to the importer, or by the seller to the buyer, that the weight may hold out when the goods are weighed again.

The king allows 1½ lb draught for goods weighing no less than 1 Cwt. 2½ lb for goods weighing between 1 and 2 Cwt. 3½ lb for goods weighing between 2 and 3 Cwt. 4½ lb from 3 to 10 Cwt. 7½ lb from 10 to 18 Cwt. 9½ lb from 18 to 30, or upwards.

**DRAUGHT-HOOKS**, are large hooks of iron, fixed on the cheeks of a cannon-carriage, two on each side, one near the trunnion hole, and the other at the train, distinguished by the name of fore and hind draught-hooks. Large guns have draught-hooks near the middle transum, to which are fixed the chains that serve to keep the shafts of the limbers on a march. The fore and hind hooks are used for drawing a gun backwards or forwards, by men with strong ropes, called draught-ropes, fixed to these hooks.

**DRAUGHT-HORSE**, in farming, a sort of coarse-made horse, destined for the service of the cart or plough. In the choice of these horses, for what is called the slow draught, they are to be chosen of an ordinary height; for otherwise, when put into the cart, one draws unequally with the other, and the tall ones hang upon the low ones. The draught horse should be large bodied, and strong loined, and of such a disposition as rather to be too dull than too brisk; and rather to crave the whip, than to draw more than is needful. Mares are the fittest for this use for the farmer, as they will be kept cheap, and not only do the work, but be kept breeding, and give yearly increase of a foal of the same kind, and fit to be bred to the same purposes. They should have a good head, neck, breast, and shoulders: for the rest of the shape, it is not of much consequence, only for breeding; the mare should have a large belly; for the more room a foal has in the dam, the more fit he will be for that employ. See the article **FOAL**.

**DRAW**, in the sea-language. A ship is said to draw so much water, according to the number of feet she sinks into it; so that if a ship sink into the water eighteen feet perpendicularly, she is said to draw eighteen feet water; and according as she draws more or less, she is said to be of more or less draught.

**DRAW,**

**DRAW**, or **DOG-DRAW**, in the forest-law. See the article **DOG-DRAW**.

**DRAW-BACK**, in commerce, certain duties, either of the customs or of the excise, allowed upon the exportation of some of our own manufactures; or upon certain foreign merchandize, that have paid duty on importation.

The oaths of the merchants importing and exporting, are required to obtain the draw-back of foreign goods, affirming the truth of the officer's certificate of the entry, and the due payment of the duties: and these may be made by the agent or husband of any corporation or company, or by the known servant of any merchant usually employed in making his entries, and paying his customs. In regard to foreign goods entered outwards, if less quantity or value be fraudulently shipped out than is expressed in the exporter's certificate, the goods therein mentioned, or their value, are forfeited, and no draw-back to be allowed for the same. Foreign goods exported by certificate, in order to obtain the draw-back, not shipped or exported, or re-landed in Great Britain, unless in case of distress, to save them from perishing, are to lose the benefit of the draw-back, and are forfeited, or their value, with the vessels, horses, carriages, &c. employed in the re-landing thereof; and the persons employed in the re-landing them, or by whose privacy they are re-landed, or into whose hands they shall knowingly come, are to forfeit double the amount of the draw-back. Officers of the customs conniving at, or assisting in any fraud relating to certificate-goods, besides other penalties, are to forfeit their office, and to suffer six months imprisonment, without bail or mainprize; as are also masters, or persons belonging to the ships employed therein. Bonds given for the exportation of certificate-goods to Ireland, must not be delivered up, nor draw-back allowed for any goods, till a certificate under the hands and seals of the collector or comptroller, &c. of the customs be produced, testifying the landing.

The computation of what is to be drawn back upon the exportation of foreign goods, may be seen under their respective heads.

**DRAW-BRIDGE**, a bridge made after the manner of a floor, to draw up, or let down, as occasion serves, before the gate of a town or castle. See **BRIDGE**.

A draw-bridge may be made after several

different ways, but the most common are made with plyers, twice the length of the gate, and a foot in diameter. The inner square is traversed with a cross, which serves for a counterpoise; and the chains which hang from the extremities of the plyers to lift up or let down the bridge, are of iron or brass.

In navigable rivers it is sometimes necessary to make the middle arch of bridges with two moveable platforms, to be raised occasionally, in order to let the masts and rigging of vessels pass through. This kind of draw-bridge is represented in plate LXXVIII. where AB is the width of the middle arch; AL and BL, the two piers that support the draw-bridge NO, one of the platforms of which is raised and the other let down, having the beam PQ for its pleyer. To NO are suspended two moveable braces EH, EH, which resting on the support E, press against the bracket M, and thereby strengthen the draw-bridge. These braces are conducted to the rest by means of the weight S, pulling the chain SLE.

**DRAW-GEAR**, denotes any kind of harness for draught horses.

**DRAW-NET**. See the article **NET**.

**DRAWER** of a bill of exchange, the person who draws the bill upon his correspondent. See **BILL** and **EXCHANGE**.

**DRAWING**, in general, denotes the action of pulling out, or haling along: thus we read of tooth-drawing, wire-drawing, &c. See **TOOTH** and **WIRE**.

**DRAWING**, the art of representing the appearances of objects by imitation, or copying without the assistance of mathematical rules.

The general precepts for drawing, are as follow. 1. Begin with plain, geometrical figures, as lines, angles, triangles, polygons, arches, circles, ovals, cones, cylinders, and the like, being the foundation of all other proportions. The circle is of use in the several orbicular forms, as the sun, moon, globes, &c. the oval in giving a just proportion to the face and mouth, and the square confines a picture you are to copy, &c. the triangle is of use in drawing a side or half face; angles and arches in perspective, and the polygon in ground plots, fortifications, &c. the cone, in spires, steeples, tops of towers, &c. the cylinder, in columns, pillars, pilasters, &c. See the article **PERSPECTIVE**. 2. Having brought your hand to be fit and ready in general proportions, accustom yourself to give every object its due shade,

shade, according to its concavity or convexity, and to elevate or depress the same, as the object appears either nearer or farther off the light. See the articles PROPORTION, DESIGN, and SHADE.

3. The second practice of drawing, consists in forming fruits, as apples, pears, cherries, &c. with their leaves; the imitation of flowers, as roses, tulips, carnations, &c. herbs, trees, &c. of different kinds.

4. The third, in the imitation of beasts, fowls, fishes, &c.

5. The fourth practice of drawing consists in the imitation of the body of man, with all its lineaments, as head, nose, eyes, ears, cheeks, arms, and shadows, all exactly proportioned, both to the whole, and to one another.

6. The fifth is in the drapery, in the imitation of cloathing, and artificially setting off the outward coverings, habit, and ornaments of the body, either of cloth, stuff, silk, or linnea, in their natural and proper folds. See DRAPERY.

7. In drawing of all the forms before-mentioned, it is requisite to be first perfect in the laying down the exact proportion; secondly, in the general or outward lines, before you proceed to shadowing, or trimming the work within.

8. In mixed and uncertain forms, where the circle, square, &c. will be of no use, but only in the idea thereof in your own fancy, as horses, oxen, and the like, you must do it by judgment, and so gain the true proportions by assiduous practice: thus, having the shape of the thing in your mind, first draw it rudely with a coal; then, with more exactness, with a lead or pencil; then peruse it well, and mend it in those parts you have erred in, according to the idea you carry in your mind. When it is mended by your own judgment, compare it with some good pattern of the same kind, and amend it by that.

9. Having good copies to draw after, learn to reduce them to other proportions, either larger or smaller; and this by frequent practice.

10. Let a perfection in drawing be attained by diligent exercise, and the instruction of a good master, before there be any attempts as to colouring and painting; for the former being attained, the rest will be easily understood, and gained by frequent practice.

*Particular observations with regard to DRAWING, are as follow.* 1. If you

draw after a print or picture, place it in such a light, that the gloss of the colours may not interrupt your light, and that the light and your eye may equally and obliquely fall upon the piece, which should be placed at such a distance, that, upon opening your eye, you may view it at once: the larger the picture is, the greater distance off it should be placed: it should also be right before you, and a little reclining.

2. Draw your out-lines at first very faint, and with a coal; and let them be drawn agreeable to the pattern, before you begin to shadow any part of it. When you have drawn one feature, it should, in some measure, be a direction for you to draw the other, by observing the distance from that to the next feature; making a small mark at the place with your coal, then draw it, and so to the next, till you have drawn the whole figure.

3. Then observe the middle of the picture you would copy, and touch upon the paper with the point of your coal: afterwards, observe the more conspicuous and uppermost figures, if there are more than one, which you are to touch lightly in their proper places: thus running over the whole draught, you will see, as it were, the skeleton of the piece to draw.

4. Having made out these sketches, view them diligently, if they answer your pattern or not; for the gestures of the life ought to shew themselves eminently in the first and rudest draughts thereof: correct and mend whatever you perceive amiss, adding and diminishing as it varies from the pattern; by which method it will be brought nearer and nearer to the life.

5. Observe the distance of one limb, joint, or muscle, from another, and the same in all other accidents of the figure, their length, breadth, turnings, &c. shadow next to the light very faintly; and where you see bold and free touches, be not timorous in expressing the same. In drawing a head by the life, or otherwise, take care to place the features exactly right upon the cross lines, whether it be a full face, or three quarter face. In foreshortening you must make the cross lines to fly upwards, where they look upwards; but where the aspect is downwards, they must be made downwards, in a circular manner. Having drawn the out-lines true, with a coal, you are to proceed to trace the same lines again with a pen, indian ink,

ink, &c. drawing them with more exactness, and by imitating all the hatches with their exact distances one from another, their crossings, turnings and windings, with more boldness and freedom perfect your design.

6. In drawing after a naked body, all the muscles are not to be so plainly expressed as in anatomical figures; but that side whose parts are most apparent, and of signification in the performance of any action, must be made to appear more or less, according to the force of that action.

7. In drawing young persons, the muscles must not appear manifestly so hard, as in elder and full grown persons: the same is to be observed as to fat and fleshy persons, and such as are very delicate and beautiful; and in women, scarce any muscles at all are to be expressed, or but very little, unless it be in some very terrible action, and then too they are to be represented very faintly; the like is also to be observed as to little children.

8. The motion of the whole body must be considered in drawing of the muscles; as in the rising and falling of the arms, the muscles of the breast do appear more or less; the hips do the like according as they are bent outward or inward; and it is the same chiefly in the shoulders, sides, and neck, according to the several actions of the body.

9. The proportion of the figure ought to be multiplied by degrees, in proportion of one to two, three, four, &c. for herein the chief skill consists: the diameter of the biggest place, between the knee and the foot, is double to the least, and the largest part of the thigh, triple.

**DRAWING MEDICINES**, those more usually called epispastics and ripeners. See the articles **EPISPASTICS** and **RIPENERS**.

**DRAWING of a bill of exchange**. See the articles **DRAWER** and **BILL**.

**DRAWING**, among sportmen, the beating the bushes after a fox.

Drawing amiss, is said of the hounds or beagles, when they hit the scent of their chase contrary, so as to pursue it up the wind, when they should have done it down.

Drawing on the shot, is when the hounds touch the scent, and draw on till they hit on the same scent.

**DRAWING a cast**, among bowlers, is winning the end, without stirring the bowl or block.

**Fine-DRAWING**, among taylors, the art of sewing up button-holes, or any rents in cloth, in so nice a manner, as that they cannot be discovered from the entire part of the cloth.

**DRAY**, a kind of cart used by brewers, for carrying barrels of beer or ale; also a sledge drawn without wheels.

**DRAY**, among sportsmen, denotes squirrel-nests, built in the tops of trees.

**DRAY-PLOUGH**. See the article **PLOUGH**.

**DRAYTON**, a market-town of Shropshire, fourteen miles north-east of Shrewsbury.

**DREDGE**, or **DREG**, among farmers, denotes oats and barley mingled together.

**DREDGERS**, the term used in the admiralty-court for the oyster-fishers.

**DREIN**, in the military art, a trench made to draw the water out of a moat, which is afterwards filled with hurdles and earth, or with fascines, or bundles of rushes and planks, to facilitate the passage over the mud. See the article **TRENCH**.

**DRENCH**, among farriers, a physical potion for horses. The ingredients for this purpose are to be beat coarsely, and either mingled with a decoction, or with wine. Then let all infuse about a quarter of an hour, and give it to the horse with a horn, after he has been tied up two hours to the rack.

**DRESDEN**, the capital of upper Saxony, in Germany, situated on the river Elbe, sixty-five miles north-west of Prague, and eighty-five south of Berlin: east long. 13° 36', north lat. 51°. It is one of the largest and strongest towns in Germany, and is the usual residence of the elector of Saxony.

**DRESSING of hemp and flax**. See the articles **HEMP** and **FLAX**.

**DRESSING of hops**. See the article **HOPS**.

**DRESSING of meats**, that part of cookery which regards animal foods, whether flesh or fish. See the article **COOKERY**.

**DRESSING of ores**, the breaking and powdering them in the stamping-mill, and afterwards washing them in a wooden trough. See the articles **STAMPING-MILL** and **WASHING**.

**DRESSING**, in surgery, the treatment of a wound or any disordered part. The apparatus of dressing consists of dossils, tents, plaisters, compresses, bandages, bands, ligatures, and strings. See the articles **WOUND**, **DOSSIL**, **TENT**, **PLASTER**, &c.

**DREUX**, a town of Orleans, in France, seventeen miles north of Chartres, and thirty-five west of Paris.

**DRIE**, the same with dry. See **DRY**.

**DRIFT** *of the forest*, is an exact view and examination taken at certain times to know what beasts are there; in order that none may come on the forest but such as have right; and that the forest be not overcharged with beasts.

**DRIFT**, in mining, a passage cut out under the earth, betwixt shaft and shaft, or turn and turn; or a passage or way, wrought under the earth, to the end of a meer of ground, or part of a meer.

**DRIFT**, a term used at sea. Thus any thing that floats upon the water, is said to run a-drift.

**DRIFT-SAIL**, a sail used under water, veered out right a head by sheets, as other sails are. It serves to keep the ship's head right upon the sea in a storm, and to hinder her driving too fast in a current.

**DRILL**, in mechanics, a small instrument for making such holes as punches will not conveniently serve for. Drills are of various sizes, and are chiefly used by smiths and turners.

**DRILL**, or **DRILL-BOX**, a name given to an instrument for sowing land in the new method of horse-hoeing husbandry. It plants the corn in rows, makes the channels, sows the seeds in them, and covers them with earth when sown; and all this at the same time, and with great expedition. The principal parts are the feed-box, the hopper, the plough and its harrow, of all which the feed-box is the chief. It measures, or rather numbers, out the seeds which it receives from the hopper, and is for this purpose as an artificial hand; but it delivers out the seed much more equally than can be done by a natural hand. See the article **PLOUGH**.

Whoever is desirous of knowing more intimately the whole apparatus for this method of sowing, may see it fully described, and illustrated with figures, by Tull, in his *Horse-hoeing husbandry*.

**DRINK**, a part of our ordinary food in a liquid form, serving to dilute and moisten the dry meat. See the article **DIET**. The drinks in different countries are different. The common drink in England is either water, malt-liquor, wine, or mixtures of these.

The first drinks of mankind were certainly water and milk, but the love of luxury and debauchery soon introduced

the art of preparing intoxicating and enervating drinks out of vegetables. The vine gave the first of these liquors; after this, wheat, barley, millet, oats, rice, apples, pears, and pomegranates; and after those the juices drained from the pine, sycamore, and maple, were brought to this use: in latter times, roots, berries, and the pith of the sugar-cane, have been employed for the same purposes. Honey also is in some repute, and before the use of the things above-mentioned, the vinous liquor made of honey and water, was in the very highest estimation. It is acknowledged by many physicians, that among the strong drinks, wine is the most pernicious; and that good water, milk, beer, and cyder, are greatly preferable to it; none of them bringing on the variety of disorders to which immoderate wine-drinkers are subject, such as decay of sight, trembling of the limbs, &c.

Of all drinks, water is the least flatulent, because the unelastic air lodged in it, cannot be extricated by the heat of the body, so as to become elastic. The most flatulent of all drinks, are these taken in the act of fermentation; as for example, the ale which is close shut up in very strong bottles, and flies out with the greatest force upon opening them; for by an imprudent use of such, the most severe colic, iliac passion, and cholera morbus, frequently ensue. Next to these come such drinks as have not yet fermented, but are soon set to work by the heat of the body; as for example, must, new wine, or ale, wherein no bitter herbs, such as hops, wormwood, &c. have been boiled as a preservative.

Dr. Bryan Robinson thinks that the proportion of meat to drink, ought to be such as shall make perspiration and urine nearly equal at all seasons of the year.

**DRINKING-GLASSES**. See **GLASSES**.

**DRIPS**, in architecture. See the article **LARMIER**.

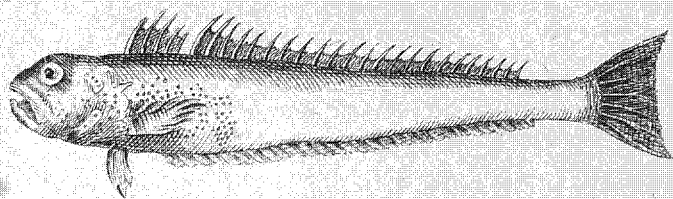
Drips are used in building for a certain kind of steps made on flat roofs to walk upon, a way of building much used in Italy, where the roof is not made quite flat, but a little raised in the middle, with drips or steps lying a little inclined to the horizon. See the article **ROOF**.

**DRIVERS**, among sportsmen, a machine for driving pheasant-powts, consisting of good strong ozier-wands, such as the basket-makers use; these are to be set in

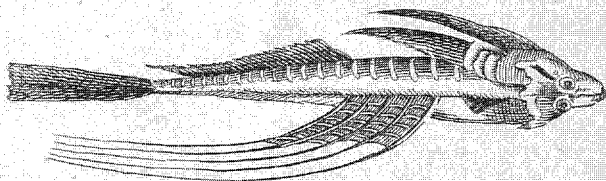




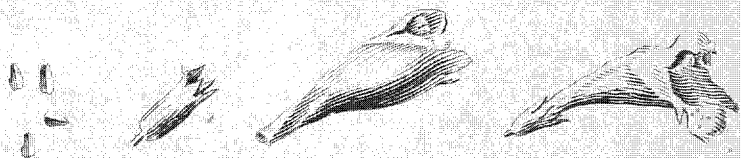
*Fig. 1. DRACO MARINUS, the SEA-DRAGON.*



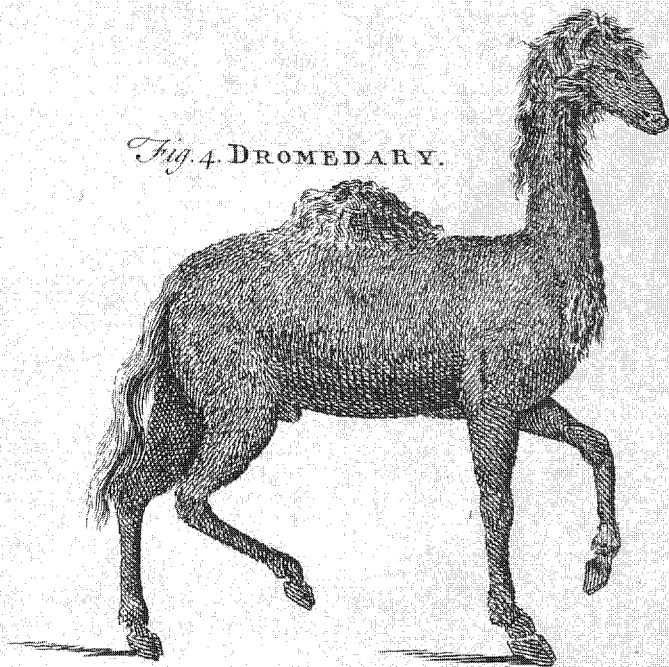
*Fig. 2. DRACUNCULUS, the Little SEA-DRAGON.*



*Fig. 3. DRACOCEPHALUM, DRAGON'S HEAD.*



*Fig. 4. DROMEDARY.*



in a handle, and twisted or bound with small ozers in two or three places.

With this instrument, the sportsman drives whole eyes of young powns into his nets. See the next article.

**DRIVING**, among sportsmen, a method of taking pheasant-powts. It is thus : the sportsman finds out the haunts of these birds ; and having fixed his nets there, he calls them together by a pheasant-call, imitating the voice of the dam : after this he makes a noise with his driver, which will make them run a little way forward in a cluster ; and this he is to repeat till he has made sure of them, which an expert sportsman never fails to do, by driving them into his nets.

**DRIVING**, in metallurgy, is said of silver, when in the operation of refining, the lead being burnt away, the remaining copper rises upon its surface in red fiery bubbles. See the article **SILVER**.

**DRIVING**, in the sea-language, is said of a ship when an anchor being let fall will not hold her fast, nor prevent her sailing away with the tide or wind. The best help in this case is to let fall more anchors, or to veer out more cable ; for the more cable she has out, the safer she rides. When a ship is a-hull or a-try, they say she drives to leeward.

**DRIVE-BOLTS**, in ship-building. See the article **BOLT**.

**DROCK**, in husbandry, the upright piece of timber on the right side of a plough's tail, to which is fixed the earth-board. See the article **PLOUGH**.

**DROGHEDA**, a port-town of Ireland, twenty-three miles north of Dublin.

**DROGMAN**, the same with dragoman. See the article **DRAGOMAN**.

**DROIT**, *jus*, signifies right or law, of which some distinguish six kinds. 1. *Jus recuperandi*, right of recovery. 2. *Jus entrandi*, right of entering. 3. *Jus habendi*, right of having. 4. *Jus retinendi*, right of retaining. 5. *Jus percipiendi*, right of receiving. 6. *Jus possidendi*, right of possessing. See the articles **ENTRY**, **POSSESSION**, and **RECOVERY**.

**DROIT** is also the highest writ of all other real writs, and takes its name of a writ of right, from the greatest regard being shewn to it ; and as it has the most assured and final judgment. There are several sorts of these writs used in our law, as *droit de avowson*, *droit de dower*, *droit de garde*, *droit patent*, *droit rationabili parte*, and *droit sur disclaimer*. See the article **RECTO**.

**DROITWICH**, a borough six miles north of Worcester, which sends two members to parliament.

**DROMEDARY**, *dromedarius*, a large animal of the camel-kind, with only one bunch on its back : it is taller than the horse, and has a much longer and slenderer neck : its ears are short, and the upper lip is divided in the manner of that of the hare : it is a native of Asia, and more used for riding on, than for carrying heavy loads. See plate **LXXXIX**. fig. 4.

**DROMEUS**, a name given by the antients to two very distinct animals, the stag and dromedary.

**DRONE**, in the history of insects, a kind of bee, larger than the common working or honey-bees : it is so called from its idleness, as never going abroad to collect either honey or wax. See **BEE**.

The number of these drones in a hive is more or less, according to the season and age of the swarm. In a full hive, they sometimes amount to five or six hundred, or even a thousand.

**DRONE-FLY**, a two-winged insect, extremely like the common drone-bee, whence also the name.

**DRONTE**, a name used by some for the dodo. See the article **DODO**.

**DROPAX**, an external medicine used by the antients for inducing a redness upon a part, and also for taking off the hairs from the body. It was either simple or compound. The simple consists of pitch and wax. The compound *dropax*, besides pitch and wax, admits pepper, bitumen, rosemary-feed, and euphorbium. It was used in the form of a plaster, or cataplasm.

**DROPPING**, or **DRIPPING**, among falconers, is said of a hawk which mutes directly downwards in several drops, not jerking her dung straight forwards.

**DROPS**, in architecture, an ornament in the doric entablature representing drops, or little bells immediately under the triglyphs.

**DROPS**, in meteorology, small spherical bodies which the particles of fluids spontaneously form themselves into, when let fall from any height. This spherical figure, the newtonian philosophers demonstrate to be the effect of corpuscular attraction ; for considering that the attractive force of one single particle of a fluid is equally exerted to an equal distance, it must follow that other fluid particles are on every side drawn to it, and will therefore take their places at an

equal distance from it, and consequently form a round superficies. See the articles **ATTRACTION, FLUID, and RAIN.**

**DROPS**, in medicine, a liquid remedy, the dose of which is estimated by a certain number of drops.

**DROPS of life, gutta vitæ**, a tincture produced from opium, english saffron, russiaca, castor, cochineal, and Virginia-snake-root, nutmegs, zedoary and camphire, with the tincture of antimony. This medicine, though not commonly met with, is accounted one of the best preparations of the kind. It promotes sweat very much, and is wonderfully carminative. The dose is from ten to forty, fifty, or sixty drops.

**English DROPS, gutta anglicana**, a name given to a chemical preparation esteemed of great virtue against vapours, and lethargic affections, and purchased at 5000*l.* by king Charles II. from the inventor Dr. Goddard. The medicine appeared to be only a spirit drawn by the retort from raw silk, and afterwards rectified with oil of cinnamon, or any other essential oil, and was in reality no better than the common sal volatile oleosum, or any of the volatile spirits impregnated with an essential oil, except that it was less disagreeable than any of them to the taste.

**DROPSY**,  *Dropsy*, in medicine, an unnatural collection of watry humours in any part of the body.

Dropsies are of various kinds, but those most common are the anasarca, ascites, and tympanites. See the article **ANASARCA**; &c.

Among the causes of these diseases may be reckoned a family or constitutional disposition thereto; a hasty drinking cold water in too large quantities; a stoppage of the natural discharges of perspiration and urine; a hienterious disorder of long continuance; all obstinate obstructions of the viscera; the jaundice, diarrhoea, dysentery, coeliac passion, and gout; drinking sharp, fermented, and spirituous liquors; and the like.

As to the symptoms, the feet and legs first swell; and when these are distended to the utmost, the waters rush into the abdomen, and cause it to swell by little and little; till at length the more noble viscera are affected thereby, and the patient is soon overwhelmed with the deluge. In proportion as the diseased parts increase in bulk, the rest fall away; and at the same time, the difficulty of

breathing, and other symptoms grow more intolerable.

When the abdomen is swelled, it will rebound when struck, if the disease be a tympany; and if an ascites, the noise of the fluctuating waters is heard. Besides these symptoms, the patient is also afflicted with a heaviness, stupor, costiveness, and at length with a slow fever. The waters too, after being long pent up in a close place, grow acrimonious; and hence ulcers, gangrenes, bleeding at the nose, a mortification of the viscera, and death.

In the anasarca, as well as in the more advanced stages of a dropsy, the chief indications of cure, are to restore the humours to their natural fluidity, invigorate the languid circulation, brace up and strengthen the relaxed solids, promote the secretions, and carry off the redundant stagnating juices. To this purpose, drastic purges, steel-medicines, absorbents, detergents, and stomachics are recommended. A brisk purge should be taken early every morning, or every other day, according to the strength of the patient, till the swelling of the parts affected abate.

Elaterium, and antimonial wine, are said to be excellent for dropical patients, who are not easily purged; two grains of the former being a proper dose for most constitutions; and of the latter, or antimonial wine, a dram and a half, or two drams, may be taken every morning: this frees the abdomen from the load of waters. Some greatly recommend Bon-tius's pills, the dose of which is from half a scruple to a scruple. Mercurius dulcis, and the juice of the root of iris palustris lutea are also recommended: eighty drops of this last may be given every hour in a little syrup of buck-thorn.

As to cathartics, the slow ones are rather hurtful than beneficial; and therefore, the purge had better be too strong than too weak, that the waters may be carried off with as much speed as the patient's strength will bear. When the patient is of a very weakly constitution, it is proper to omit all purgatives, and give diuretics and the lixivial salts in their stead, especially nitre. Some also have been cured by a pertinacious abstinence from all liquids, excepting a little rich wine.

When the waters are by these means carried off, the tone of the debilitated viscera

viscera should be restored by the use of wines, steel, and such strengtheners as are greatly astringent; in which case, purging must be omitted, as also during the use of the lixivial salts; but strengtheners may be properly used with these last.

For the operation of tapping, called by surgeons paracentesis. See the article PARACENTESIS.

**DROP-WORT**, in botany, the same with the filipendula. See FILIPENDULA.

*Water DROP-WORT*, the english name of a plant, called by authors oenanthe. See the article OENANTHE.

**DROSER A**, *SUN-DEW*, in botany, a genus of the *pentandria-pentagynia* class of plants, with a funnel-fashioned flower, consisting of five obtusely-ovated petals; the fruit is an unilocular, suboval capsule, containing a great many very small seeds.

**DROUGHT**, in the history of the air, a long continuance of dry weather.

Great droughts are often very prejudicial to the farmer, unless the lands lie very low, and are well supplied with water, or defended from the scorching heat of the sun by tall inclosures. See the articles INCLOSURE, and WATERING OF LANDS.

**DROWNING**, the act of suffocating, or being suffocated, by water.

Naturalists and physicians furnish us with divers well attested instances of surprising recoveries of persons drowned. It is certain from repeated dissections made on persons drowned, that they generally have less water in their stomachs than if they had voluntarily drunk a considerable quantity; whence it does not seem expedient to hang the drowned person by the heels, a position that must prove uneasy as soon as the humours of the body should resume their ordinary motion. In order to know whether the person has swallowed too much water, or not, and to make him vomit it up if he has, it is proper to put him in a tun, open at both ends, which is to be rolled in different directions; or the bearded end of a feather should be introduced into the œsophagus. After taking off the cloaths of the drowned person, we ought, with the utmost expedition, to shelter him from the impressions of the cold air, and begin to warm him by wrapping him up with cloaths, and coverings: to do this more effectually, he is afterwards to be put

into a pretty warm bed, applying also to his body hot napkins and cloths. A hot scorching sun, to which drowned persons have been exposed, and hot baths, have produced the same happy effects.

The great intention to be pursued is, to put the solid parts of the machine in action, that thus they may restore the motion of the fluids: in order to this, the drowned person should be agitated in various directions, in a bed, in the arms of persons of sufficient strength.

Spirituous liquors should be poured into his mouth; or warm urine; and some persons prescribe a decoction of pepper and vinegar, as a gargalism; we must also attempt to irritate the internal fibres of the nose, either by volatile spirits, and by the liquors used in apoplectic cases; or by tickling the nerves of the nostrils with a bearded feather, or by blowing through a quill, snuff, or some other more powerful stimulatory. One of the means frequently used with success, is to blow warm air, by means of a pipe, into their mouths; or to introduce it by a pair of bellows; or, by injecting warm clysters, to irritate the intestines: the smoke of tobacco conveyed into the intestines, by means of a tobacco-pipe, is much recommended. Venesection is by no means to be neglected; and perhaps most successfully in the jugular vein; and when all these measures prove unsuccessful, the last resource is branchotomy.

See the article BRANCHOTOMY.

**DRUG**, a general term for goods of the druggist and grocery kinds, especially for those used in medicine and dying.

The principal drugs in medicine make the greatest part of the wholesale trade in the druggist and spicery ways. Some are produced in France, England, &c. but the greatest part is brought from the Levant, and the East Indies. The chief drugs imported into this kingdom, are from the East-Indies, being as follows, alum, china-root, camphor, rhubarb, musk, vermilion, soy of japan, ketchup, stick-lack, rosam aloes, shell-lack, borax, lapis lazuli, galangal, benjamin, aquila-wood, gamboge, putchuck, or costus dulcis, dragonblood, cubebs, cardamoms, olibanum, chengue, salt-petre, aloë-hepatica, bezoar-stone, lignum aloes, cassia, goa-stone, opium, unicorn's horn, civet, frankincense, tamarinds, turmeric, rock-salt, saffron, myrrh, manna, renes, cacamahac, ambergrease, dammer, coyr,

cowries,

cowries, chank, nux vomica, snake-stone, cassia lignum, assafoetida, dry ginger, long pepper, tyncal, sago, lapis tutiæ, wormseed, galbanum, gum-elemi, ammoniacum, tragacanth. See the articles ALUM, CHINA-ROOT, &c.

Drugs for dying are of two principal sorts, *viz.* drugs that do not give any colour of themselves, but prepare the stuff to take the dye, or make the colours more lively and strong; and drugs that colour.

Of the first sort are alum, tartar, arsenic, realgal, salt-petre, nitre, sal-gem, sal-armoniac, common salt, mineral salt, salt of crystal, of tartar, agaric, spirit of wine, urine, pewter, bran, starch, &c. Some of the colouring drugs are wood, indigo, scarlet wood, logwood, ironwood, &c. scarlet grain, cochineal, madder, goats hair, greenening weed, savory, chimney-foot, &c.

There are other drugs used in common by both, which colour either faintly, or very much; as the root, bark, and leaf of the walnut-tree, the rind of the nut, gall-nuts, sumach, copperas, &c.

DRUG is used to signify things of little value exposed to sale.

DRUG, among fan-makers, is a composition of gum arabic, and some other ingredients used in laying gold or silver leaf upon fans; or, in covering them with either of these metals in powder. They use it also to paste together the papers, gauzes, taffeta's, and other like matters, used by them in their fans.

DRUG signifies also a salt, or cinder of glass, used by some in bleaching cloth.

The use of this drug is prohibited in France, as being found corrosive, destructive of the linnen, and capable of hurting the health of those who use it. See BLEACHING.

DRUGS of the french dominions pay for every 20 s. value of their respective rates, (a few excepted) on importation, 4 s. 9  $\frac{7}{10}$  d. and draw back on exportation 4 s. 4  $\frac{1}{10}$  d. If for dyer's use, they pay 6 s. 7  $\frac{1}{10}$  d. and draw back 6 s. 1  $\frac{1}{10}$  d. Drugs of the growth, product, or manufacture of France, for every 20 s. value of their respective rates (some excepted) pay 6 s. 5  $\frac{1}{10}$  d. and draw back 4 s. 4  $\frac{1}{10}$  d. but if for dyer's use, they pay 11 s. 7  $\frac{1}{10}$  d. and draw back 6 s. 1  $\frac{1}{10}$  d. All drugs imported from the british plantations, in british built shipping, notwithstanding they come

from the spanish West-Indies to ours, shall pay as from the place of growth and no otherwise.

DRUGGET, in commerce, a stuff sometimes all wool, and sometimes half wool half thread, sometimes corded, but usually plain.

Those that have the woof of wool, and the warp of thread, are called threaded druggets; and those wrought with the shuttle on a loom of four marches, as the serges of Moui, Beauvois, and other like stuffs, corded, are called corded druggets. As to the plain, they are wrought on a loom of two marches, with the shuttle, in the same manner as cloth, camlets, and other like stuffs, not corded.

DRUIDS, the priests or ministers of religion of the antient Britons, and Gauls. The druids were chose out of the best families; and were held, both by the honours of their birth, and their office, in the greatest veneration. They are said to have understood astrology, geometry, natural history, politics, and geography: they had the administration of all sacred things, were the interpreters of religion, and the judges of all affairs indifferently.

Whoever refused obedience to them, was declared impious and accursed: they held the immortality of the soul, and the metempsychosis; they are divided by some into several classes, as the vaceni, bardi, bubagis, semothii: they had a chief, or arch-druid, in every nation: he was a sort of high-priest, having an absolute authority over the rest, and was succeeded by the most considerable among his survivors. The youth used to be instructed by them, retiring with them to caves, and desolate forests, where they were sometimes kept twenty years. They preserved the memory and actions of great men by their verses; but are said to have sacrificed men to Mercury. Cæsar imagined that the druids came from Britain into Gaul, but several among the modern writers are of a different opinion.

DRUM, *lympanum*, is a martial musical instrument in form of a cylinder, hollow within, and covered at the two ends with vellum, which is stretched or slackened at pleasure by the means of small cords and sliding knots. It is beat upon with sticks. Some drums are made of brass, but they are commonly of wood.

There

DUBLIN, the capital of the province of Leinster, and of all Ireland, situated at the mouth of the river Liffey, sixty miles west of Holyhead in Wales: west long.  $6^{\circ} 25'$ , north lat.  $53^{\circ} 16'$ . It is a large and beautiful city, pleasantly situated; having a view of the sea on one side, and of a fine country on the other.

other. It is the seat of the courts of justice, and an archbishop's see; and has a noble college, which is an university of itself.

**DUCAL**, in general, something belonging to a duke. See the article **DUKE**.

**DUCAL CROWN**, or **CORONET**.<sup>2</sup> See the article **CROWN**.

**DUCAT**, a coin, current in Germany, and other countries abroad, for the different values of which see **COIN**.

**DUCATOON**, a silver coin, likewise frequent in several parts of Europe. See the article **COIN**.

**DUCENARIUS**, in roman antiquity, a military officer, who had the command of two hundred men.

The title *ducenarii* is also given to certain procurators of the emperors, so called either from their having a salary of 200 sesterces, or from their being appointed to raise the tax of the two hundredth penny.

**DUCES TECUM**, in law, a writ that commands a person to appear in the court of chancery, and bring with them certain writings, evidences, or other things, which the court is inclined to view.

**DUCES tecum licet languidus**, in law, is a writ directed to the sheriff on a return, that he is not able to bring his prisoner without danger of death, he being *adeo languidus*: upon which the court grants a habeas corpus, in nature of a *duces tecum licet languidus*.

**DUCK**, *anas*, in ornithology, is characterized in general under the article **ANAS**.

There are two sorts of ducks common with us, the tame and wild; whereof the first is very beneficial to the husbandman, and at the same time requires no charge to keep, living on lost corn, worms, snails, &c. Indeed once a year this fowl is a great layer of eggs, and when she sits, must be carefully fed with barley or other grain. As to the ducklings, they are fed in the same manner as goslings, and may be fattened in three weeks time, by giving them any kind of pulse or grain, and plenty of water.

For preserving wild ducks, a place (with a pond in it) must be walled in, and covered a-top with a strong net: the pond is to be set with tufts of ozers, and have many secret holes and creeks, whereby they will be induced to feed freely, though imprisoned. Teals, widgeons, shell-drakes, and green plovers, may also be ordered in the same manner.

Of exotic or foreign ducks, authors describe a great many species, as the muscovy-duck, with a naked papillose face; the tufted duck, the brasilian duck, as large as a goose, St. Cuthbert's duck, the forked-tailed duck, the black duck, &c. See plate **LXXX**. fig. 1. where n<sup>o</sup> 1. represents the little black and white duck, somewhat less than the common kind; and n<sup>o</sup> 2. the summer duck of Mr. Catesby, likewise less than the common duck: it has a double plume or crest, the uppermost of a shining green, and the under one of a dark, shining purple colour. *Edwards*.

**DUCKER**, or **DOUCKER**, a particular kind of game-cock, that in fighting runs about the clod almost at every blow he gives.

**DUCKER**, is also a name given to the colymbus, or diver. See **COLYMBUS**.

**DUCKING**, plunging in water, a diversion antiently practised among the Goths; by way of exercise; but among the Celts, Franks, and antient Germans, it was a sort of punishment for persons of scandalous lives.

They were shut up, naked to the shift, in an iron cage, fastened to the yard of a shallop, and ducked several times.

**DUCKING at the main-yard**, among seamen, is a way of punishing offenders on board a ship; and is performed by binding the malefactor, by a rope, to the end of the yard, from whence he is violently let down into the sea, once, twice, or three times, according to his offence: and if the offence be very great, he is drawn underneath the keel of the ship, which they call keel-hauling.

**DUCKUP**, at sea, is a term used by the steer's man, when the mainfail, forefail, or spritfail, hinders his seeing to steer by a land-mark: upon which he calls out, *duckup the clew lines of these sails*, that is, hale the fails out of the way. Also, when a shot is made by a chase-piece, if the clew of the sprit-fail hinders the sight, they call out, *duck-up*, &c.

**DUCT**, *ductus*, in general, denotes any tube or canal.

It is much used by anatomists, who mention the adipose ducts, concerning the reality of which authors are not agreed; the thoracic, or chyloferous duct; the excretory ducts of the glands; the hepatic duct, or porus biliaris; the salival ducts; the lachrymal ducts; the ductus communis choledochus, &c. concerning all which it is to be observed, that their use



Fig. 1. Ducks.

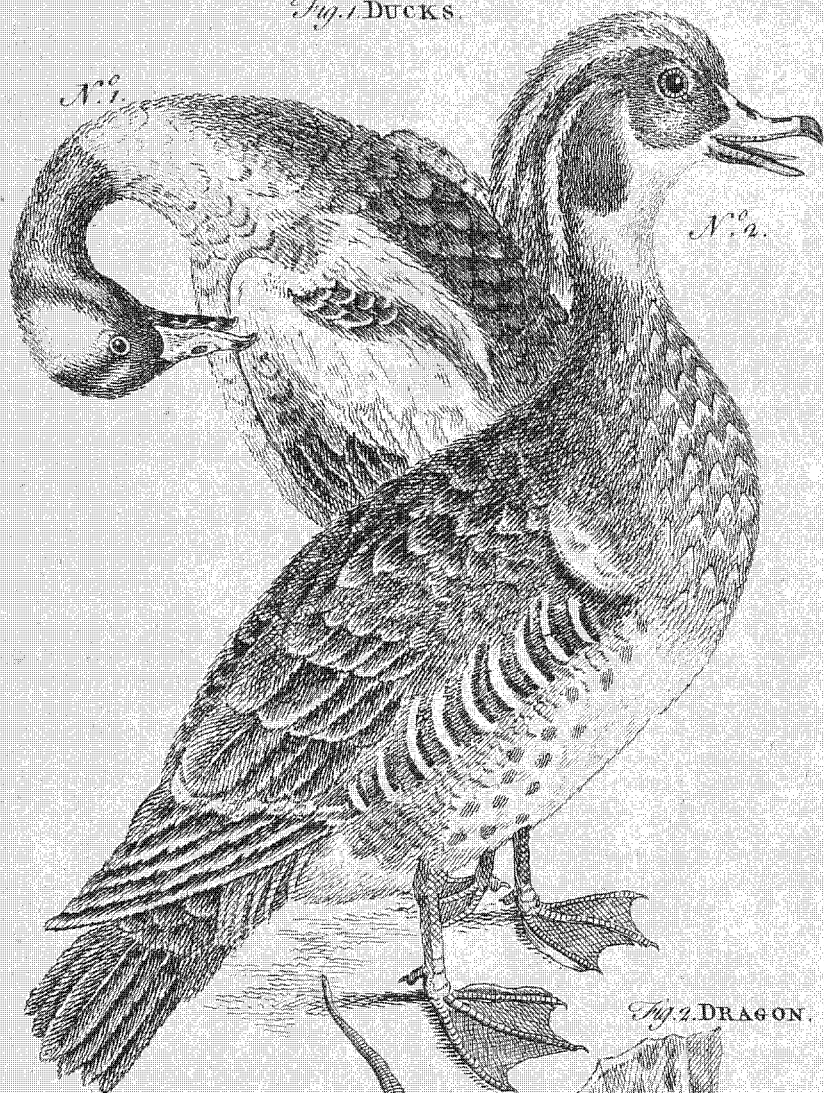


Fig. 2. DRAGON.

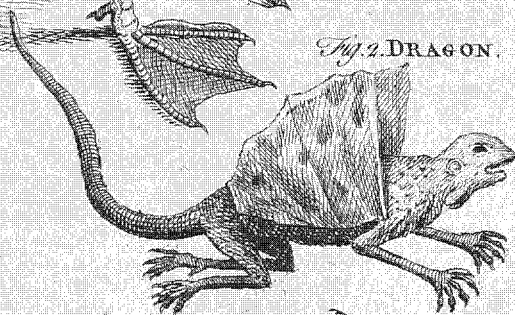
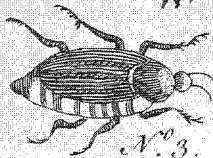
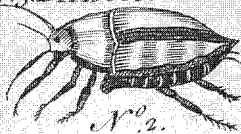
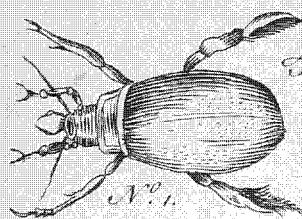


Fig. 3. DYTISCUS.





use is to convey certain animal fluids secreted in the glands of the parts to which they severally belong : thus it is, the salival ducts discharge the saliva, or pellucid liquor, secreted in the glands of the mouth ; and so of the rest.

*Air-DUCT*, among ichthyologists, a canal reaching from the air-bladder in fishes to their stomach. See *AIR-BLADDER*.

*Alimentary DUCT*, an appellation used by some for the whole canal of the intestines, reaching from the mouth to the anus.

**DUCTILITY**, in physics, a property of certain bodies, whereby they are capable of being expanded, or stretched forth, by means of a hammer, press, &c.

The vast ductility of some bodies, especially gold, is very surprizing : the gold-beaters and wire-drawers furnish us with abundant proofs of this property ; they, every day, reduce gold into lamellæ inconceivably thin, yet without the least aperture, or pore discoverable, even by the microscope : a single grain of gold may be stretched under the hammer, into a leaf, that will cover a house, and yet the leaf remain so compact, as not to transmit the rays of light ; nor even admit spirit of wine to transude. Dr. Halley took the following method to compute the ductility of gold : he learned from the wire-drawers, that an ounce of gold is sufficient to gild, that is, to cover, or coat, a silver-cylinder of forty-eight ounces weight, which cylinder may be drawn out into a wire so very fine, that two yards thereof shall only weigh one grain ; and consequently ninety-eight yards of the same wire, only forty-nine grains : so that a single grain of gold here gilds ninety-eight yards ; and, of course, the ten thousandth part of a grain is here above one third of an inch long. And since the third part of an inch is yet capable of being divided into ten lesser parts visible to the naked eye, it is evident that the hundred thousandth part of a grain of gold may be seen without the assistance of a microscope. Proceeding in his calculus, he found, at length, that a cube of gold, whose side is the hundredth part of an inch, contains 2,433,000,000 visible parts ; and yet, though the gold where-with such wire is coated, be stretched to such a degree, so intimately does its parts cohere, that there is not any appearance of the colour of the silver underneath.

Mr. Boyle examining some leaf-gold, found that a grain and a quarter's weight took up an area of fifty square inches ; supposing therefore the leaf divided by parallel lines  $\frac{1}{160}$  of an inch apart, a grain of gold will be divided into five hundred thousand minute squares, all discernable by a good eye : for gold-wire, the same author shews, that an ounce of gold drawn out therein, would reach 155 miles and a half.

But Mr. Reaumur has carried the ductility of gold to a still greater length : a gold-wire every body knows is only a silver one gilt. This cylinder of silver, covered with leaf-gold, they draw thro' the hole of an iron, and the gilding still keeps pace with the wire, stretch it to what length they can. Now Mr. Reaumur shews, that in the common way of drawing gold-wire, a cylinder of silver twenty-two inches long, and fifteen lines in diameter is stretched to 1,163,520 feet, or is 634,692 lines longer than before, which amounts to about ninety-seven leagues. To wind this thread on silk for use, they first flatten it, in doing which it stretches at least  $\frac{1}{2}$  farther, so that the twenty-two inches are now 111 leagues : but in the flattening, instead of  $\frac{1}{2}$ , they could stretch it  $\frac{1}{4}$ , which would bring it to 120 leagues. This appears a prodigious extension, and yet it is nothing to what this gentleman has proved gold to be capable of.

**DUDERSTAT**, a town of Upper Saxony, thirty-five miles north-east of Cassel.

**DUEL**, a single combat, at a time and place appointed, in consequence of a challenge. This custom came originally from the northern nations, among whom it was usual to decide all their controversies by arms. Both the accuser and accused gave pledges to the judges on their respective behalf ; and the custom prevailed so far amongst the Germans, Danes and Franks, that none were excused from it but women, sick people, cripples, and such as were under twenty-one years of age, or above sixty. Even ecclesiastics, priests, and monks, were obliged to find champions to fight in their stead. The punishment of the vanquished was either death, by hanging or beheading ; or, mutilation of members, according to the circumstances of the case. Duels were at first admitted not only on criminal occasions, but on some civil

civil ones for the maintenance of rights to estates, and the like: in latter times, however, before they were entirely abolished, they were restrained to these four cases: 1. That the crime should be capital. 2. That it should be certain the crime was perpetrated. 3. The accused must, by common fame, be supposed guilty. And, 4. The matter not capable of proof by witnesses. In England, though the trial by duel is disused, the law on which it is founded is still in force. See the article **CHAMPION**.

**DUEL**, at present, is used for a single combat on some private quarrel, and must be premeditated, otherwise it is called a rencounter. If a person be killed in a duel, both the principals and seconds are guilty of murder, whether the seconds engage or not. It is also a very high offence to challenge a person, either by word or letter, or to be the messenger of a challenge. The severe edicts made by Lewis XIV. against duels, have in a great measure put a stop to the custom in France.

**DUERO**, or **DURO**, a large river, which, rising in Old Castile, in Spain, runs from east to west, crosses the province of Leon, and, after dividing Portugal from Spain by a southerly course, turns westward, crosses Portugal, and falls into the Atlantic ocean at Porto-Port.

**DUKE** is either the title of a sovereign prince, as the duke of Savoy, Parma, &c. the grand duke of Tuscany, Muscovy, &c. or it is the title of honour and nobility next below princes. The commanders of armies in time of war, the governors of provinces, and wardens of marches, in time of peace, were called *duces*, under the latter emperors. The Goths and Vandals divided all Gaul into duchies and counties, the governors of which they sometimes call *duces* and sometimes *comites*. In France, under the second race of kings, though they retained the name and form of ducal government, there were scarce any dukes except those of Burgundy, Aquitain, and France. In England, among the Saxons, the commanders of armies, &c. were called dukes, *duces*, without any addition, till Edward III. made his son, the black prince, duke of Cornwall; after whom there were more made in the same manner, the title descending to their posterity. Duke, then, at present, is a mere title of dignity, without giving any domain, territory, or jurisdiction over the

place from whence the title is taken. A duke is created by patent, investiture of sword, mantle of state, imposition of a cap and coronet of gold on his head, and a verge of gold put into his hand. His title is Grace; and, in the style of the heralds, Most high, potent, high-born, and noble prince.

**DUKE**, among hebrew grammarians, an appellation given to a species of accents, answering to our comma.

**DULCICHNIUM**, in botany, a name used by some for the sweet cyperus. See the article **CYPERUS**.

**DULCIFYING**, in pharmacy, is the sweetening any matter impregnated with salts, by frequently washing it in pure water.

**DULCIS ASSA**, or **ASA**. See the articles **BENZOIN** and **ASA**.

**DULEDGE**, in gunnery, a peg of wood which joins the ends of the six fellows that form the round of a wheel of a gun-carriage. The plate of iron on the out side of the wheel, which strengthens the joint, is called the duledge-plate.

**DULL**, in the manege. The marks of a dull horse, called by the French, *marquis de ladre*, are white spots round the eye, and on the tip of the nose, upon any general colour whatsoever. Though the vulgar take these spots for signs of stupidity, it is certain they are great marks of the goodness of a horse; and the horses that have them are very sensible and quick upon the spur.

**DULNESS of hearing**. See the article **DEAFNESS**.

**DULWICH**, a village near London, remarkable for its mineral waters, which are said to contain a bitter cathartic salt, but no iron. See **EPSOM-SALT**.

**DUMBLAIN**, a town of Scotland, about five miles north of Stirling.

**DUMBNESS**, the deprivation of speech. See the article **SPEECH**.

Dumbness may be owing either to the want, or bad conformation of the tongue. See the article **TONGUE**.

**DUMFERMLING**, a parliament-town of Scotland, situated in the county of Fife, fifteen miles north-west of Edinburgh: west lon. 3° 20', and north lat. 56° 15'. Here was formerly a magnificent abbey and palace of the kings of Scotland, in which the princess Elizabeth, daughter of King James VI, and mother of the princess Sophia, from whom the present royal family are descended, was born.

**DUMFRIES**, the capital of a county of the same name, in Scotland, lying northwards

wards of the Solway frith : west lon.  $3^{\circ} 26'$ , and north lat.  $54^{\circ} 45'$ .

**DUM FUIT INFRA ÆTATEM**, is a writ, that an infant, who by feoffment has aliened his lands, may have, when he arrives to full age, for the recovery of what he so aliened : and during his non-age, it is said, he may enter on the land, and take it back again ; for, by his entry, he shall be remitted to his ancestor's right.

**DUM NON FUIT COMPOS MENTIS**, in law, a writ which a person who is not found in memory, having aliened lands or tenements, shall have against the alienee ; in which he must alledge, that he was not *sane memorie*, but being visited with infirmity, lost his discretion for a time, so as not to be capable of making any grant, &c.

**DUNBAR**, a parliament and port-town of Scotland, about twenty-five miles east of Edinburgh.

**DUNBARTON**, the capital of a county of the same name in Scotland, called by some Lenox : it is a parliament-town, situated at the confluence of the rivers Clyde and Leven ; sixteen miles north-west of Glasgow.

**DUNCANNON**, a town of the county of Wexford, in Ireland, six miles east of Waterford.

**DUNDALK**, a port town of Ireland eighteen miles north of Drogheda.

**DUNDEE**, a large parliament-town of Angus, in Scotland, situated on the north-side of the frith of Tay, fourteen miles north-west of St. Andrews : west lon.  $2^{\circ} 42'$ , and north lat.  $56^{\circ} 32'$ .

**DUNG**, in husbandry, is of several sorts, as that of horses, cows, sheep, hogs, pigeons, geese, hens, &c. for the several properties of which, see HORSE, COW, SHEEP, &c.

All dungs are very enriching to lands ; but some, as horse's, sheep's, pigeon's, &c. being hot and light, are fittest for cold lands ; as those of cows, hogs, &c. are for hot and dry lands, on account of their cooling qualities ; or mixed together in different proportions, they may be made to answer for all sorts of ground. In winter, or rainy weather, it is proper to turn up the dung in as large heaps as possible, to prevent the rain's washing away its fatness and nitrous quality ; which purpose the dung-meers answer extremely well. See the article DUNG-MEERS.

**DUNGANNON**, a town of Ireland, eleven miles north of Armagh,

**DUNGEON**. in fortification. See the article DONJON.

**DUNGING of pastures, &c.** The best time for dunging pastures and meadows is in the winter season, about January or February, that the rain may wash the fatness of the soil to the roots of the grafs before the sun drives it away. The dung may be spread with a bush, drawn over the ground like a harrow, before the grafs is too high : and for rusty cold land, wood-ashes, sea-coal, peat, turf, or the like fuel, is very proper to be laid on. The dung of pigeons, or other fowl, has a better effect here than on any other lands ; also all hot and sandy soils are fittest for this sort of ground : but for such land of this kind as is sandy, or hot, lime, chalk, marl, or any cold soils, digged out of the earth, are of singular use, as well as for corn-lands : so is urry in like manner. As for meadows, or grounds of a middle quality between these extremes, the ordinary soil is best. The principal part of good husbandry consists in a proper application of the compost.

**DUNKELD**, a town of Perthshire in Scotland, formerly a bishop's see, situated about twelve miles north of Perth.

**DUNG-MEERS**, in husbandry, places where soils and dungs are mixed and digested together. For this purpose it is usual to dig a pit sufficient to hold the stock of soil the husbandman is capable of making ; and to prepare it at the bottom with stone and clay, that it may hold water, or the moisture of the dung ; and besides, it should be so situated that the sinks and drips of the houses and barns may run into it. Into this pit they cast refuse-fodder, litter, dung, weeds, &c. where they lie and rot together, till the farmer have occasion for it. Where such a pit is wanting, it is proper to cover the dung with turf, or other stuff, to prevent the sun and wind from drawing off its virtues.

**DUNKIRK**, a port town of the french Netherlands : east lon.  $2^{\circ} 28'$ , and north lat.  $51^{\circ}$ .

**DUNLIN**, in ornithology a small species of snipe, with the breast and throat white, the belly black spotted with white, and the upper part of the body red variegated with pretty large black spots.

**DUNNEGAL**, the capital of a county of the same name in Ireland, situated on a bay, to which it likewise gives name : west lon.  $8^{\circ} 22'$ , and north lat.  $54^{\circ} 35'$ .

**DUNNINGTON**, a market-town of Lincolnshire, about twenty-three miles south-east of Lincoln.

**DUNS**, a market-town of Scotland, twelve miles west of Berwick upon Tweed.

**DUNSTABLE**, a market-town, fifteen miles south of Bedford, and thirty north-west of London.

**DUNWICH**, a borough of Suffolk, forty miles east of Bury.

It sends two members to parliament.

**DUO**, in music, a song or composition to be performed in two parts only, one sung, the other played on an instrument, or by two voices.

**DUO** is also when two voices sing different parts, as accompanied with a third, which is a thorough base. It is seldom that unisons and octaves are used in duos, except at the beginning and end.

**DUODECIMA**, in music, is the twelfth, or the fifth doubled. See **FIFTH**.

**DUODENUM**, in anatomy, the first of the small guts, intestina tenuia, so called from its length, which is about twelve fingers breadth. It has its origin at the pylorus, or right orifice of the stomach; from which ascending a little; it afterwards descends again, and towards its end re-ascends, and runs transversely towards the left kidney: at the distance of three or four fingers from the pylorus it receives, at one prominent hiatus or mouth, the choledochic and pancreatic ducts, which discharge their respective liquors into it. The coats of the duodenum are thicker than those of any other of the small guts, and its cavity is also greater than that of any of them. Near its origin it has no valves, nor rugæ or wrinkles; but in its continuation it has very numerous and remarkable ones, called by authors *juga*. It has also the glands of Brunnerus in great number, which serve for the secreting of a thin aqueous fluid: and it receives an artery from the *cœliac*, and a vein from the *porta*.

**DUPLÉ**, among mathematicians, denotes the ratio of 2 to 1. Thus the ratio of 8 to 4 is *duplé*, or as 2 to 1.

*Sub-Duplé Ratio* is just the reverse of the former, or as 1 to 2. Such is 4 to 8, or 6 to 12.

**DUPLEX QUERELA**. See the article **DOUBLE QUARREL**.

**DUPLICATE**, among lawyers, denotes a copy of any deed, writing, or account. It is also used for the second letters patent, granted by the lord chancellor in a case wherein he had before done the same,

Also a second letter written and sent to the same party and purpose as a former, for fear of the first's miscarrying, is called a duplicate.

**DUPLICATE PROPORTION**, or **RATIO**, is a ratio compounded of two ratios: thus, the duplicate ratio of *a* to *b*, is the ratio of *aa* to *bb*, or of the square of *a* to the square of *b*. Hence the duplicate ratio ought to be well distinguished from double.

In a series of geometrical proportionals, the first term to the third is said to be in a duplicate ratio of the first to the second: thus in 2, 4, 8, 16, &c. the ratio of 2 to 8 is duplicate of that of 2 to 4, or as the square of 2 to the square of 4. Duplicate ratio is therefore the proportion of squares, as triplicate is of cubes, &c. and the ratio of 2 to 8 is said to be compounded of that of 2 to 4, and of 4 to 8.

**DUPLICATION**, in general, signifies the doubling of any thing, or multiplying of it by 2: also the folding of any thing back again on itself.

The duplication of a cube is a problem famous in antiquity: it was proposed by the oracle at Delphos, as a means to stop the plague, to double Apollo's altar, which was cubical.

The difficulty of the problem consists in this, to find the side of a cube that shall be double in solidity to a given cube; which is only to be solved by finding two mean proportionals between the side of the given cube and double that side. Thus, if the given side be represented by *a*, its double by *b*, and the side sought by *y*; we shall have *aa:yy::y:b*; and making  $z = \sqrt[3]{a}$ , it will be *a:z::y:b*. So that

*y*, the side of the cube sought, is the second of two mean proportionals between *a* and *b*.

**DUPLICATION**, among anatomists, a term used to denote the folds of any membrane, or vessel: thus we say, the duplicatures of the intestines, peritonæum, &c. See **INTESTINES**.

**DUPONDIUS**, in antiquity, the weight of two pounds: also a piece of money equal to two asēs in value. See the articles **AS**, **POUND**, and **LIBRA**.

**DURA MATER**, in anatomy, one of the membranes, or meninges, as they are called, which surround the brain. See the article **BRAIN**.

It is a robust and thick membrane, composed of tendinous fibres, and situated immediately

immediately under the cranium : its figure and magnitude correspond exactly to those of the brain. It adheres every where to the skull, only more laxly on the upper part than elsewhere : it adheres also, tho' not very firmly, to the parts placed under it. It receives arteries from the carotids, beautifully ramified in the manner of shrubs. Its veins are of two kinds, some as in other parts of the body, and others of a triangular figure, called sinuses, for carrying off the blood from the brain. It has nerves for sensation, from the fifth and seventh pair of the brain.

The dura mater has a motion, said to be peculiar to itself, and of a muscular kind : but it seems much more natural to suppose it owing to the pulsations of the arteries of the brain.

As to the uses of this membrane, it serves in the place of a periosteum to the internal parts of the skull ; also to defend the brain by its processes, to prevent the compression of its parts ; and by its sinuses to give warmth to the brain.

**DURANCE**, a river of France, which falls into the Rhone, a little below Avignon.

**DURANTA**, a genus of plants, the class of which is not yet ascertained : the flower is formed of a single petal, with a cylindrical tube and ringent mouth, the upper limb of which is oval, erect, and hollow ; and the lower one divided into three parts : the fruit is a roundish unilocular berry, covered with the cup : the seeds are four, and of an angular figure. *Linnaeus*.

**DURATION**, an idea which we get by attending to the fleeting and perpetually perishing part of succession ; the idea of succession being acquired by reflecting on that train of ideas which constantly follow one another in our minds, as long as we are awake. The simple modes of duration are any different lengths of it whereof we have distinct ideas, as hours, days, years, time, eternity, &c.

Duration, as marked by certain periods and measures, is what we most properly call time. See the article **TIME**.

**DURATION of action**, according to Aristotle, is confined to a natural day in tragedy ; but the epopea, according to the same critic, has no fixed time.

**DURATION of an eclipse**. See **ECLIPSE**.

**Scruples of half DURATION**. See the article **SCRUPLE**.

**DURESSE**, in law, is where a person is wrongfully imprisoned, or restrained of his liberty, contrary to law ; or is threat-

ened to be killed, wounded, or beaten, till he executes a bond, or other writing.

Any bond, deed, or other obligation, obtained by duresse, will be void in law ; and in an action brought on the execution of any such deed, the party may plead that it was brought by duresse. A deed must be avoided by special pleading, in these cases ; for the party cannot plead to it, *non est factum*, because it is his deed.

**DURHAM**, a city and county, in the north of England, situated on the river Were, fourteen miles south of Newcastle : west lon.  $1^{\circ} 12'$ , and north lat.  $54^{\circ} 50'$ .

Durham is the see of a bishop, and sends two members to parliament.

**DURION**, an east-india fruit, much esteemed by the natives, who prefer it to all others, though the Europeans cannot endure its nauseous smell, which is not unlike that of rotten onions.

**DUSSELDORP**, a city of Germany, situated on the eastern shore of the Rhine, twenty miles north of Cologne : east lon.  $6^{\circ} 20'$ , and north lat.  $51^{\circ} 15'$ .

**DUST** is nothing else but dry earthy particles, reduced to a fine light powder.

Dust and sand will sometimes get into horses mouths, and make them lose their appetites ; in which case it is proper to give them bran well moistened with water, to cool and refresh their mouths and tongues.

The Hebrews, when they mourned, put dust or ashes upon their heads ; and in their afflictions, they sat down in the dust, and threw themselves upon the ground.

**DUTCHY**, in geography, an appellation given to the dominions of a duke. See the article **DUKE**.

**DUTCHY-COURT**, a court of the dutchy-chamber of Lancaster, held at Westminster, before the chancellor of the same, for matters concerning the lands and franchises of that dutchy. See the article **CHANCELLOR**.

The proceedings in this court are by english bill, as in chancery. Gwyn says, that this court grew out of the grant of king Edw. III. who gave the dutchy to John of Gaunt, and endowed it with royal rights and privileges : several others of our antient kings likewise separated this dutchy from the crown, and settled it in the natural persons of themselves and their heirs ; though, in succeeding times, it was united to the crown again.

**DUTY**,

**DUTY**, in general, denotes any thing that one is obliged to perform.

**DUTY**, in polity and commerce, signifies the impost laid on merchandizes, at importation or exportation, commonly called the duties of customs; also the taxes of excise, stamp-duties, &c. See the article **CUSTOMS**, **EXCISE**, &c.

The principles on which all duties and customs should be laid on foreign merchandizes, which are imported into these kingdoms, are such as tend to cement a mutual friendship and traffic between one nation and another; and, therefore, due care should be taken in the laying of them, that they may answer so good an end, and be reciprocal in both countries: they should be so laid as to make the exports of this nation at least equal to our imports from those nations wherewith we trade, so that a ballance in money should not be issued out of Great Britain, to pay for the goods and merchandizes of other countries; to the end that no greater number of our landholders and manufacturers should be deprived of their revenues arising from the product of the lands, and the labour of the people, by foreign importations, than are maintained by exportations to such countries. These are the national principles on which all our treaties of commerce with other countries are to be grounded.

To shew, says the late sir Matthew Decker, how excises, customs, and salt-duties increase the expence of the people, and consequently ruin our trade, the following account may not be improper.

First the duties themselves. The net produce of the taxes following, was, before the late war, computed to be, one year with another, as under:

Excise, about	£. 2,800,000
Customs, about	1,700,000
Salt, about	150,000
	<hr/> 4,650,000

The charges of raising those }  
duties are about 10 per cent. } 465,000

Net produce 5,115,000

Secondly, the advanced price of those goods the above duties are laid on. Experience teaches us that a very small duty laid on commodities, raises the price of them considerably to the consumer, beyond the gross duty. By the fees given to officers; by tradesmens loss of time in attending upon excisemen, or at custom-houses; by taking away a quarter of our traders stocks for duties; and forcing

them to take as great pains on one quarter of their stock laid out in goods, in order to live, as they would on the whole if duty free; by tradesmens profits on the duty, and advances in all the hands that all taxed goods come through, to the consumer; as for example, suppose there should be no other tax but that on leather, let us see how many advances that would make on the price of shoes.

The grazier lays (1) on the beast he fatts, his advanced price of shoes: he sells to the butcher, who takes (2) his profit on the grazier's advanced price of the beast; and raises (3) on the hide his advanced price of shoes: he sells to the tanner, whose journeymen raise (4) their wages, on account of the advanced price of shoes; the tanner pays (5) the tax of two pence per pound on the leather; takes (6) his profit on the before-mentioned five advances, and raises (7) his advanced price of shoes on the tanned hide: he sells to the leather-cutter, who takes (8) his profit on the before-mentioned seven advances, and raises (9) on the hide he cuts, his advanced price of shoes: he sells to the shoe-maker, whose journeymen raise (10) their wages, on account of their advanced price of shoes; the shoe-maker takes (11) his profit on the before-mentioned ten advances, and raises (12) on the shoes he makes, the advanced price of the shoes he wears: he sells to the consumer with all these twelve advances, highly magnified beyond the bare duty.

So much for the tax on leather only; but the grazier, butcher, tanner, leather-cutter, and shoe-maker, use soap: that soap, like leather, is taxed, and, like that leather-tax, must be raised: but that caused twelve advances on our shoes; place therefore twelve advances more on shoes, for the soap-tax. These tradesmen use candles; twelve advances more for the tax on them; and the same for every other tax on necessities. All which duly considered, might be computed at above cent. per cent. on the gross produce of the duties; but though the large duties cause some farther advance on all the goods they are laid on, charged with profit upon profit, through every hand they pass; yet as they keep not pace with the small duties, and as all calculations appear fair when moderate, let us abate in the advances, and set them down only at 50 per cent. 2,557,500.

The amount of the advanced price of the goods these duties are laid on, 7,672,500 l.

Let



Let us see how this 7,672,500*l.* circulates through the people, advances the prices of our goods, and consequently ruins our trade. First, this dearness of all necessities, which raise the first cost of goods, must advance the price of all labour.

The Spectator, n<sup>o</sup> 200. computes, that the people without property, who work for their daily bread, consume two thirds of our customs and excises, and therefore they pay two thirds of them and their consequences. As these people live but from hand to mouth, whatever is laid on them they must, therefore, shift off, or they cannot live; and since these various taxes have been projected, they must earn enough, when they do work, to pay the taxes, the advanced price of taxed goods, and the advanced prices of all other necessities, *viz.* meat, bread, cloathing, or whatever they can use, not only for the consumption of the days they are employed, but for those also they are not: therefore they are the cause of raising the wages of the working people two thirds of 7,672,500*l.* the amount of the advanced price of the goods the above duties are laid on, which makes 5,115,000*l.*

Secondly, the dearness of all necessities forces the master-tradefmen to raise on their customers the taxes and advances on their consumption.

The same author allows one third consumption of our customs and excises to people with property; but as those may be divided into two classes, *viz.* those in trade, and those out of trade, and the proportion consumed by each not being ascertained by any author, they are computed by sir Matthew at half and half; therefore the master-tradefmen, or people with property in trade, *viz.* merchants, manufacturers, mechanics, farmers, wholesale dealers, and retailing shopkeepers, must each lay on the goods they consume, whether food, cloathing, or utensils, their one sixth consumption of 7,672,500*l.* the amount of the advanced price of the goods the above duties are laid on, makes 1,278,750*l.*

Thirdly, tradefmen's paying advanced prices on their goods, must have advanced profits: for whether they lay out their stocks of money in goods that bear their natural value only, or goods that double their value by taxes, still a living profit must be obtained on the stocks they employ. For the wages of the manufacturer, the mechanic, the labourer, and the expence: of the master-tradefman, being of ne-

cessity raised, the first cost of goods must be so too: and considering the various tradefmen's hands that goods pass through, from the workman or labourer, to the consumer, charged with profit upon profit by each of them, the advance thereby made, may, at a moderate rate be computed at 50 *per cent.* to the consumer on the above two articles, which raise the first cost of goods, and makes 3,196,875*l.* People with property, out of trade, their sixth of 7,672,500*l.* the amount of the advanced price of the goods the above duties are laid on, makes 1,278,750*l.* and the total advance is 10,869,375*l.*

This is part of the amount of the consequences of raising 4,650,000*l.* for the government, by our present manner of taxing goods.

Our other taxes are, the land-tax; the gross produce, at 4*s.* in the pound, is about 1,960,000*l.*

The stamps, windows, post office, &c. their computed gross produce about 500,000*l.* The poor's tax is computed, on a middling rate, to equal the land-tax, but must be much more when trade is reduced, and the price of provisions high: however, to reckon it at no more than the land-tax, or 1,960,000*l.* General amount of all our taxes, and part of their consequences, before the late war, 15,289,375*l.*

Let us now see the amount of our taxes with regard to our expences: The British Merchant computes our people at seven millions, and their expences at 7*l.* per head; but as necessities are grown dearer since the year 1713, when he wrote, and the number of people increased, let us compute the people at eight millions, and their expences at 8*l.* per head, which makes our total expences annually 64,000,000*l.* of which the people pay for the taxes and their consequences, as above, 15,289,375*l.* which being subtracted, their expences, if untaxed, would be only 48,710,625*l.*

15,289,375*l.* charged on 48,710,625*l.* is a tax of above 31 *per cent.* on the expences of the people, which must add a prodigious artificial value to our goods, consequently render them less saleable, and ruin our trade.

If it be admitted that foreigners pay on that consumption a great portion of our taxes, for what goods they take of us; yet if that was originally intended, and expected to continue the same, as at the first laying on our taxes, it will be the strongest argument to the contrary; for

as our taxes on necessities are proved to be so burdensome and extensive, by raising the prices of our goods, foreigners take less of them yearly; and when the demand is reduced, the people having less work, find less money to pay, and yet have their taxes proportionably increased on them as they lose their trade: for as the government abates neither expences or taxes, and, if one method of taxing fails, another is tried, what foreigners cease to pay, we must: or, in other words, the less trade and money, the more taxes; and the more our taxes are, the less trade and money we must expect. Through the whole of this work, we have, under the several articles, as they occurred, generally annexed the principal duties which belong to each as a branch of the royal revenue; and for further information upon this head, we refer the reader to what is said under the articles *CUSTOM, COMPANY, DRAWBACK, EXCISE, &c.*

In Spain, the duties of exportation and importation amount to about *5 per cent.* of the value of the goods. In Portugal, the duties of importation on all kinds of goods are at the rate of *18 per cent.* excepting silks, which are at *13 per cent.* for exportation the duties are only *6 per cent.* The duties for exportation and importation in Holland, are nearly alike, being about the rate of *5 per cent.* In Muscovy they are the same, *viz. 5 per cent.* At Hamburgh and Bremen the duties are only *1 per cent.* and at Lubeck but  *$\frac{3}{4}$  per cent.* At Venice the duties are  *$6\frac{3}{4}$  per cent.* for importation, and the duties of exportation are about *9 per cent.* At Leghorn the duties are much the same as at Venice.

In Constantinople, Smyrna, Aleppo, and the other ports of the Levant, the duties of exportation and importation, being nearly the same, are at *3 per cent.* In Cairo, Alexandria, and other cities of Egypt, the duties on goods brought in ships from Europe, are at *20 per cent.* but the duties on the goods brought by the caravans from Asia, are arbitrary, and always high: they pay no duty on exportation, besides the custom-house fee, which is only  *$1\frac{1}{2}$  per cent.*

**DUTY**, in the military art, is the exercise of those functions that belong to a soldier; with this distinction, that mounting guards and the like, where there is no enemy directly to be engaged, is called duty; but their marching to meet and fight an enemy is called going on service.

**DUUMVIRATE**, the office or dignity of the duumviri. See the next article.

The duumvirate lasted till the year of Rome 388, when it was changed into a decemvirate.

**DUUMVIRI**, in roman antiquity, a general appellation given to magistrates, commissioners, and officers, where two were joined together in the same functions.

**DUUMVIRI CAPITALES** were the judges in criminal causes: from their sentence it was lawful to appeal to the people, who only had the power of condemning a citizen to death. These judges were taken from the body of the decuriones; they had great power and authority, were members of the public council, and had two lictors to walk before them.

**DUUMVIRI MUNICIPALES**, were two magistrates in some cities of the empire, answering to what the consuls were at Rome: they were chosen out of the body of the decuriones; their office lasted commonly five years, upon which account they were frequently termed *quinquinales magistratus*. Their jurisdiction was of great extent: they had officers walking before them, carrying a small switch in their hands; and some of them assumed the privilege of having lictors, carrying axes and the fasces, or bundles of rods, before them.

**DUUMVIRI NAVALES** were the commissaries of the fleet, first created at the request of M. Decius, tribune of the people, in the time of the war with the Samnites. The duty of their office consisted in giving orders for the fitting of ships, and giving their commissions to the marine officers, &c.

**DUUMVIRI SACRORUM** were magistrates created by Tarquinius Superbus, for the performance of the sacrifice, and keeping of the sybils books. They were chosen from among the patricians, and held their office for life: they were exempted from serving in the wars, and from the offices imposed on the other citizens, and without them the oracles of the sybils could not be consulted.

**DUYVELAND**, or **DIVELAND**, one of the islands of Zealand, in the United Provinces, lying eastward of Schonen, from which it is only separated by a narrow channel.

**DWAL**, in heraldry, the herb nightshade used by such as blazon with flowers and herbs, instead of metals and colours, for sable or black.

**DWALE**, the same with the sleepy or deadly nightshade. See **NIGHTSHADE**.

**DWARF**,

**DWARF**, in general, an appellation given to things greatly inferior in size to that which is usual in their several kinds: thus there are dwarfs of the human species, dwarf-dogs, dwarf-trees, &c.

The Romans were so passionately fond of dwarfs, that they often used artificial methods to prevent the growth of boys designed for dwarfs, by inclosing them in boxes, or by the use of tight bandages. In Italy, even at present, they wash young puppies every day with astringent liquors, in order to prevent their growth by hardening the parts.

Dwarf fruit-trees are propagated by grafting them on a quince-stock, about six inches above the ground; and when the bud is shot so far as to have four eyes, it must be stopped, to give rise for lateral branches, for which purpose the uppermost eye should always be left outwards. Apple, pear, plum, and cherry-trees are thus formed into dwarfs, but the summer and autumn pears are found to succeed best.

As to the planting of dwarf-trees, they should be set at twenty-five feet square distance; and the ground between sown or planted for kitchen use while the trees are young, only keeping at some distance from their roots: stakes also should be fixed all round them, to which the branches may be nailed with liss, and thereby trimmed in an horizontal direction, and prevented from crossing one another.

**DWARF-FERN**, *filicula*, in botany. See the article **FILICULA**.

**DWINA**, the name of two large rivers, one of which rises in Lithuania, and, dividing Livonia from Courland, falls into the Baltic sea a little below Riga: the other gives name to the province of Dwina, in Russia, discharging itself into the White sea, a little below Archangel.

**DYADIC ARITHMETIC**, the same with binary. See the article **BINARY**.

**DYE**, in architecture, any square body, as the trunk, or notched part of a pedestal: or it is the middle of the pedestal, or that part included between the base and the corniche, so called because it is often made in the form of a cube or dye. See **CORINTHIAN ORDER**, **DORIC ORDER**, &c.

**DYE** is also used for a cube of stone placed under the feet of a statue, and over its pedestal, to raise it and shew it the more.

**DYES**, in the art of dying. See the articles **COLOURS** and **DYING**.

**DYER**, a person who professes the art of dying all manner of colours. See **DYING**.

All persons occupying the trade of dyeing woollen manufactures within the city of London, or ten miles round it, shall be subject to the inspection of the company of dyers of London; and the master, wardens, and court of assistants of the said company, may appoint searchers within the said limits; and out of these limits, justices, at their quarter-sessions, may appoint such searchers, who taking to their assistance a constable, or other peace-officer, may, at all seasonable times, enter the shop or work-house of any person using the trade of dyeing, and search all cloths or other woollen goods to be dyed black or blue; and any person opposing, forfeits 10 l.

Every person dyeing cloths, &c. madder-ed, and not woaded, shall, before delivery, fix a seal of lead to them, with the letter M, on forfeiture for every yard, &c. 3 s. 4 d. Any person within England, Wales, or Berwick, dying black any bays or other woollen goods, as madder-blacks, not being dyed throughout with woad, indigo, and madder only, or dyeing any cloths, long-ells, &c. for woaded blacks, not being woaded throughout, shall forfeit for every long Bocking-bays, containing seventy yards, 44 s. For every Colchester-bays, containing thirty-five yards, 22 s. and so in proportion for other bays. For every cloth dyed black, not being woaded throughout, containing forty four yards, 40 s. All woollen goods truly madder-ed black, shall be marked with a red and blue rose; and all woollen goods truly woaded black, with a blue rose; and any person counterfeiting the said marks, or fixing such to any goods falsely dyed, for madder-ed or woaded blacks, forfeits 4 l. for every piece so marked. Any person using logwood in dyeing blue, shall forfeit 40 s. for every piece so dyed, containing forty-four yards.

**DYER of leather**, is an artificer who colours skins, either on the one side, or on the other, in the cold or hot dye. See the articles **COLOURS** and **LEATHER**.

**Hat-DYER** is said of master-hatters, who give themselves particularly to the dyeing of hats. Though there be but one freedom in this company, the masters seem to be divided into three distinct professions, the one making the hats, the other dyeing them, and a third fitting them up, and selling them. See **HATTER**.

**DYER'S WEED**, *luteola*, in botany. See the article **LUTEOLA**.

**DYEING**, the art of giving a lasting colour to silks, cloths, and other substances, whereby their beauty is much improved, and value enhanced.

This art depends chiefly on three things, *viz.* 1. Disposing the surface of the stuffs to receive and retain the colours, which is performed by washing them in different lyes, digesting, beating them, &c. in which human urine putrified, a sharp salt of ashes, divers soaps, and galls of animals, are of principal use; by means whereof the visciduous gluten of the silk-worms naturally adhering to their threads, is washed and cleaned from them, and thus they become fitted gradually to imbibe the colours. By these also the greasy foulness adhering to wool and flax is scoured off. See **CLOTH**.

2. So to grind the colours, as that they may enter the body duly prepared, and preserve their brightness undiminished. See **COLOUR** and **COLOURING**.

3. The third consists in having beautiful colours.

According to Sir W. Petty's account of what is done in particular trades by the art of dyeing, 1. There is a whitening of wax, and several sorts of linnen and cotton cloths, by the sun, air, and reciprocal effusions of water. 2. Colouring of wood and leather, by lime, salt and liquors, as in stoves, canes, and marble leathers. 3. Colouring of paper, *viz.* the marbled paper, by ditempering the colours with ox-gall, and applying them upon a stiff gummed liquor. 4. Colouring, or rather discolouring, the colours of silks, tiffanies, &c. by brimstone.

5. Colouring of several iron and copper-works into black with oil. 6. Colouring of leather into gold-colour, or rather silver-leaves into gold by varnishes, and in other cases by urine and sulphur. 7. Dyeing of marble and alabaster, with heat and coloured oils. 8. Colouring silver into the brass-colour, with brimstone or urine. 9. Colouring the barrels and locks of guns into blue and purple, with the temper of small-coal heat. 10. Colouring of glaſs (made of sands, flints, &c.) as also of crystals and earthen ware, with the rusts and solutions of metals. 11. The colouring of live hair, as in Poland, horse and man's hair: as also the colouring of furs. 12. Enameling and annealing. 13. Applying colours, as in the printing of books and pictures, and as in making of playing cards, being each of them performed in a different

way. 14. Gilding and tinning with mercury, block-tin, sal armoniac. 15. Colouring of metals, as copper with calamy, into brass, and with zink or spelter into a golden colour, or into a silver one with arsenic; and of iron into a resemblance of copper with hungarian vitriol. 16. Making painters-colours by preparing of earth, chalk, and slates; as in umber, ochre, cullen-earth, &c. as also out of calces of lead, as ceruse and minium; by sublimates of mercury and brimstone, as in vermilion; by tinging whole earths variously, as in verdeter, and some of the lakes; by concrete juices, or *ſæculæ*, as in gambogium, indigo, pinks, sap-green, and lakes; as also by rusts, as in verdigrease, &c. 17. The applying these colours by the adhesion of ox-gall, as in the marble paper aforesaid; or by gum-water, as by limning; or by clammy drying oils, such as the oils of linseed, nuts, &c. 18. The watering of tabbies. 19. The colouring of wool, linnen, cotton, silk, hair, feathers, horn, leather, and the threads and webs of them with woods, roots, herbs, seeds, leaves, salts, limes, lixivi-ums, waters, heats, fermentations, macerations, and other great variety of management: an account of all which is a short history of dyeing.

*The materials used in the art of DYEING*, are iron and steel, or what is produced from them, in all true blacks, called spanish blacks, though not in fanders-blacks, *viz.* they use copperas, steel-slings, and slippe; they also use pewter for Bow-dye scarlet, *viz.* they dissolve bars of pewter in aquafortis; litharge is also used by some, though acknowledged by few to add weight to dyed silk. Antimony is much used to the same purpose. Arsenic is used in crimson upon pretence of giving lustre, although those who pretend not to be wanting in giving lustre to their silks, disown its use. Verdigrease is also used by linnen-dyers in their yellow and greenish colours; though, of itself, it strikes no deeper colour than that of a pale straw. Of mineral salts used in dyeing, the chief is alum; the true use whereof seems to be in regard to the fixation of colours. The next mineral salt is salt-petre, not used by antient dyers, and but by few of the modern: nor is it yet used but to brighten colours, by back-boiling of them, for which argol is more commonly used: lime is much used in working blue-watts.

Of the animal family are used cochineal, urine of labouring men kept till it be stale and stinking, honey, yolks of eggs, and ox-gall; the use of the urine is to scour, and help the fermenting and heating of woad; and is used also in blue-vats instead of lime: it dischargeth the yellow, and therefore is used to spend weld withal.

Dyers use two sorts of water, *viz.* river and well-water; the last, which is harsh, they use in reds and other colours wanting restraining, and in dyeing materials of the slacker contextures, as in callicoe, fustian, and the several species of cotton-works; but is not good for blues, and makes yellows and greens look rusty. River-water is more fat and oily, and is therefore used in most cases, and must be had in great quantities for washing and rinsing their cloths after dyeing. Water is called by dyers white liquor; but a mixture of one part bran, and five of river-water boiled an hour and put into leaden cisterns to settle, is what they call liquor absolutely.

Gums have been used by dyers about silk, *viz.* gum arabic, tragacanth, mastic, dragon's blood. These tend little to the tincture, any more than gum in writing-ink, which only gives it a consistence; so gum may give the silk a glossiness; and, lastly, to increase the weight.

The three peculiar ingredients for black are coppers, filings of steel, and slippe: the restraining binding materials are alder-bark, pomegranate-peels, walnut-rinds and roots, oaken-sapling-bark, and saw-dust of the same, crab-tree-bark, galls, and sumac.

The salts are alum, salt-petre, sal armoniac, pot-ashes, and stone-lime; among which urine may be enumerated as a liquid salt.

The liquors are well and river-water, urine, aquavivæ, vinegar, lemon-juice, aquafortis, honey, and molasses.

Ingredients of another class are bran, wheaten-flour, yolks of eggs, leaven, cummin-seed, fenugreek-seed, agaric and fenna.

The sinesctics, or abstersives, are fuller's earth, soap, linseed-oil, and ox-gall.

The metals and minerals are pewter, verdigrease, antimony, litharge, and arsenic.

The colourings are of three sorts, *viz.* blue, yellow, and red; of which log-wood, old fustic, indigo, and madder, are the chief.

### *General observations upon DYEING.*

1. All materials which of themselves do give colour are either red, yellow, or blue; so that out of them, and the primitive fundamental colour white, all that great variety which we see in dyed stuffs doth arise.

2. That few of the colouring materials, as cochineal, foot, wood-wax, woad, &c. are in their outward and first appearance of the same colour, which by the slightest distempers and solutions in the weakest menstrua, they dye upon cloth, silk, &c.

3. That many of them will not yield their colours without much grinding, steeping, boiling and fermenting, or corrosion by powerful menstrua, as red-wood, weld, woad, arnotto, &c.

4. That many of them will of themselves give no colouring at all, as coppers or galls, or with much disadvantage, unless the cloth or other stuff to be dyed be as it were first covered, or incrustated with some other matter, though colourless beforehand, as madder, weld, brazil, with alum.

5. That some of them, by the help of other colourless ingredients, do strike different colours from what they would of themselves, as cochineal, brazil, &c.

6. That some colours, as madder, indigo, and woad, by reiterated tinctures, will at last become black.

7. That although green be the most frequent and most common of natural colours, yet there is no simple ingredient now used alone to dye green with upon any material; sap-green being the nearest, which is used by country people.

8. There is no black thing in use which dyes black, though both the coal and foot of most things burnt or scorched be of that colour, and the blacker, by how much the matter before being burnt was whiter, as in ivory-black.

9. The tincture of some dyeing stuffs will fade even with lying, or with the air, or will stain with water only, but very much with urine, vinegar, &c.

10. Some of the dyeing materials are used to bind and strengthen a colour; some to brighten it; some to give lustre to the stuff; some to discharge and take off the colour, either in whole or in part; and some out of fraud, to make the material dyed, if costly, heavier.

11. That some dyeing ingredients, or drugs, by the coarseness of their bodies, make the thread of the dyed stuff seem coarser; and some, by shrinking them,

smaller ; and some, by smoothing them, finer.

12. Many of the same colours are dyed upon several stuffs with several materials, as red-wood is used in cloth, not in silks ; arnotto in silks, not in cloth, and may be dyed at several prices.

13. That scouring and washing of stuffs to be dyed, is done with special materials, as sometimes with ox-galls, sometimes with fullers-earth, and sometimes soap ; this latter being, in some cases, pernicious, where pot-ashes will stain, or alter the colour.

14. Where great quantities of stuffs are to be dyed together, or where they are to be done with any speed, and where the pieces are very long, broad, thick, or otherwise, they are to be differently handled, both in respect to the vessels and ingredients.

15. In some colours and stuffs the tingent liquor must be boiling, in other cases blood-warm, and in some it may be cold.

16. Some tingent liquors are fitted for use by long keeping, and in some the virtues wear away by the keeping.

17. Some colours or stuffs are best dyed by reiterated dippings in the same liquor, some by continuing longer, and others a lesser time therein.

18. In some cases, the matter of the vessel wherein the liquors are heated, and the tincture prepared, must be regarded, as the kettles must be pewter for Bow-dye.

19. There is little reckoning made how much liquor is used in proportion to the dyeing drugs, it being rather adjusted to the bulk of the stuffs, as the vessels are to their breadth ; the quantity of dyeing drugs being proportioned both to the colour, higher or lower, and to the stuffs ; as likewise the salts are to the dyeing drugs. Concerning the weight that colours give to silk, (in which it is most taken notice of, being sold by weight, and a commodity of great price) it is observed that one pound of raw silk loseth four ounces by washing out the gums, and the natural fordes. That the same scoured silk may be raised to above thirty ounces from the remaining twelve, if it be dyed black with some materials.

Of a thing very useful in dying, especially of black, nothing increases weight so much as galls, by which black silks are restored to as much weight as they lost by washing out their gum : nor is it counted extraordinary that blacks should gain about four or six ounces in the dyeing, upon each pound. Next to galls,

old fustic encreases the weight about 1  $\frac{1}{2}$  in 12 ; madder, about one ounce ; weld, half an ounce. The blue vats in deep blues of the fifth stall, give no considerable weight ; neither doth logwood, cochineal, nor even copperas, where galls are not : slippe adds much to the weight, and giveth a deeper black than copperas itself, which is a good excuse for the dyers that use it.

#### DYEING of wooll and woollen manufactures.

For black in woollen manufactures, it is begun with a strong decoction of woad and indigo, that communicate a deep blue ; after which the stuffs being boiled with alum and tartar, or pot-ash, are to be maddered with common madder, then dyed black with Aleppo-galls, copperas, and sumac, and finished by back-boiling in weld. Wools for tapestry are only to be woaded, and then put in black. For scarlet, wooll and woollen manufactures are dyed with kermes and cochineal, with which may also be used agaric and arsenic. Crimson-scarlet is dyed with cochineal, mastic, aquafortis, sal armoniac, sublimate, and spirit of wine. Violet-scarlet, purple, amaranth, and pansy-scarlets, are given with woad, cochineal, indigo, braziletto, brazil, and orchal. Common reds are given with pure madder, without any other ingredient. Crimson-reds, carnations, flame and peach-colours, are given, according to their several hues, with cochineal, mastic, without madder, or the like. Crimson-red is prepared with roman alum with cochineal. Orange-aurora, brick-colour, and onion-peel colour, are dyed with woad and madder, mixed according to their several shades. For blues, the dark are dyed with a strong tincture of woad ; the brighter with the same liquor, as it weakens in working. Dark browns, minims, and tan-colours, are given with woad, weaker in decoction than for black, with alum and pot-ashes, after which they are maddered higher than black : for tan-colours, a little cochineal is added. Pearl-colours are given with galls and copperas ; some are begun with walnut-tree roots, and finished with the former ; though to make them more useful, they generally dip them in a weak tincture of cochineal. Greens are begun with woad, and finished with weld. Pale yellows, lemon-colour, and sulphur-colour, are given with weld alone. Olive-colours of all degrees are first put in green, and taken down with foot, more or less, according to the shade

shade that is required. Feulemort, hair-colour, musk, and cinnamon-colour, are dyed with weld and madder. Nacaret, or bright orange, is given with weld and goats hair boiled with pot-ashes.

**DYEING of silks**, is begun by boiling them in soap, &c. then scouring and washing them in water, and steeping them in cold alum-water. For crimson, they are scoured a second time, before they are put into the cochineal-vat. Red crimson is given with pure cochineal, mastic, adding galis, turmeric, arsenic, and tartar, all mixed in a copper of fair water, almost boiling: with these the silk is to be boiled an hour and a half, after which it is allowed to stand in the liquor till next day. Violet-crimson is given with pure cochineal, arsenic, tartar, and galls; but the galls in less proportion than in the former: when taken out, it is washed and put in a vat of indigo. Cinnamon-crimson is begun like the violet, but finished by back-boiling, if too bright, with copperas, and if dark, with a dip of indigo. Light blues are given in a bath of indigo. Sky-blues are begun with orchal, and finished with indigo. For citron-colours, the silk is first alumed, then welded with indigo. Pale yellows, after aluming, are dyed in weld alone. Pale and brown aurora's, after aluming, are welded strongly, then taken down with rocou and dissolved with pot-ashes. Flame-colour is begun with rocou, then alumed, and afterwards dipped in a vat or two of brazil. Carnation and rose-colours are first alumed, then dipt in brazil. Cinnamon-colour, after aluming, is dipt in brazil, and braziletto. Lead-colour is given with fustic, or with weld braziletto, galls and copperas. Black silks of the coarser sort, are begun by scouring them with soap, as for other colours; after which they are washed out, wrung, and boiled an hour in old galls, where they are suffered to stand a day or two: then they are washed again with fair water, wrung, and put into another vat of new galls; afterwards washed again, and wrung, and finished in a vat of black. Fine black silks are only put once into galls of the new and fine sort, that has only boiled an hour: then the silks are washed, wrung out, and dipped thrice in black, and afterwards taken down by back-boiling with soap.

The dyeing of thread is begun by scouring it in a lye of good ashes: afterwards it is wrung, rinsed out in river-water,

and wrung again. A bright blue is given with braziletto and indigo: bright green is first dyed blue, then back-boiled with braziletto and verdeter, and lastly woaded. A dark green is given like the former, only darkening more before woad-ing. Lemon and pale yellow is given with weld mixed with rocou. Orange isabella, with fustic, weld, and rocou. Red, both bright and dark, with flame-colour, &c. are given with brazil, either alone, or with a mixture of rocou. Violet, dry rose, and amaranth, are given with brazil, taken down with indigo. Feulemort and olive-colour are given with galls and copperas, taken down with weld, rocou, or fustic. Black is given with galls and copperas, taken down and finished with braziletto wood.

**DYKE, or DIKE.** See the article **DIKE**.

**DYKE-REEVE**, in our statutes, an officer who held the oversight of the dykes in the fen-countries.

**DYNASTY**, among ancient historians, signifies a race or succession of kings of the same line or family: such were the dynasties of Egypt.

The Egyptians reckon thirty dynasties within the space of 36525 years; but the generality of chronologers look upon them as fabulous. And it is very certain, that these dynasties are not continually successive, but collateral.

**DYPTICHS, or DIPTYCHS.** See the article **DIPTYCHS**.

**DYSCRACY**, among physicians denotes an ill habit or state of the humours, as in the scurvy, jaundice, &c.

**DYSENTERY**, *δυσεντερία*, in medicine, a diarrhoea or flux, wherein the stools are mixed with blood, and the bowels miserably tormented with gripes.

Dysenteries are distinguished into benign and malignant. The former continues longer, but proceeds more gently, and is less dangerous. The latter is not only of a contagious nature, but is also attended with some fatal symptoms, such as a malignant fever, a defect of strength, and exanthematous disorders. It may likewise be observed, that dysenteries are distinguished into red and white: in the former, the humours evacuated are always bloody; but in the latter, sanious, and mixed with carnos filaments and ulcerous shreds abraded from the coats of the intestines. The immediate cause of a dysentery, according to the most received opinion, is seated in the intestines, and is a highly acrid humour, generated

by summer fruits when unripe, fermenting with other juices, especially those of the bilious kind, and vellicating, corroding, and excoriating the nervous coats of the intestines. Others think it occasioned by a certain specific kind of miasma, whose particular quality it is to ferment in the intestines, with the bile especially, and then to corrode them. And others think that the genuine and most immediate cause which produces the severe gripes, and all the other train of symptoms in a dysentery, is principally lodged in the blood-vessels which surround the nervous coat of the intestines.

As to the prognostics, dysenteries are dangerous to pregnant women, to old men and boys, to the scorbutic, the consumptive, and the cachectic. When they begin with vomiting, succeeded with a hiccup, there is danger of an inflammation of the stomach. When clysters are immediately returned, or the anus so obstinately closed that nothing can be injected, it is a sign of a palsy in the rectum. And when swallowing is attended with a murmuring noise, it shews the approach of a delirium, an inflammation of the fauces, aphthæ, or a palsy of the whole œsophagus. The common method of curing a dysentery, is first to bleed, then to vomit with ipecacuanha, afterwards to purge with rhubarb, and, last of all, to give astringents. When the bowels are ulcerated, it will be of service to inject clysters, either of fat broth with the addition of venice-treacle, or the electuary of scordium, or Lucatelli's balsam. Sydenham, after bleeding, prescribes a paregoric at night, and the next morning a cathartic. Mr. Ray, from the information of Aubrey, says, that the fungous substance between the lobes of a walnut dried and powdered, and given in a moderate quantity of wine, cured the english army of a dysentery, when all other remedies failed. Jussieu says, a thick yellow bark, called simaruba, has been found successful in the cure of a dysentery; and Kramer assures us, we may depend on the same effect from the decoction of common millet-seed. Another specific is the vitrum antimonii ceratum, which has been in use for some time, but was kept a secret till it was communicated to the public by Dr. Young, of Edinburgh. The ordinary dose for an adult is ten or twelve grains; and it has been found successful where bleeding and vomits have been premised,

and where they have not. It is best, says Dr. Pringle, to withhold opium till the patient is both vomited and purged, and when it becomes necessary, to begin with small doses. As to the diet, the same author confines the sick, in the beginning, to rice-gruel, panado, &c. and for drink, to rice or barley-water, or the white decoction. In the convalescent state they are allowed meat, but no small-beer, and never any milk, unless diluted with lime-water, it being observed, that milk by itself was apt to renew the gripes.

**DYSERT**, a parliament-town of Scotland, in the county of Fife, situated on the northern shore of the frith of Forth, about eleven miles north of Edinburgh.

**DYSOREXY**, among physicians, denotes a want of appetite, proceeding from a weakly stomach. See **APPETITE**.

**DYSPEPSY**, a difficulty of digestion, for which physicians prescribe bitters. See the articles **DIGESTION** and **BITTERS**.

**DYSPNOEA**, a difficulty of breathing, usually called asthma. See **ASTHMA**.

**DYSURY**, *dysouria*, in medicine, a difficulty of making urine, attended with a sensation of heat and pain. It is distinguished from a strangury, as, in the last, the urine is voided by only a drop, as it were, at a time, but, however, with pain; and from an ischury, as, in this disorder, there is an almost total suppression of urine. A dysury constantly attends a virulent gonorrhœa, accompanies many other distempers as a symptom, and is frequently excited by very acrimonious medicines, and the external application of cantharides. In a dysury, emollient and mucilaginous medicines, as gum-arabic dissolved in barley-water, emulsions and decoctions, with an addition of nitre, copious draughts of diluting fluids and camphor, are usually prescribed. See **STRANGURY** and **ISCHURY**.

**DYTISCUS**, **WATER-BEETLE**, in zoology, a genus of insects of the order of the coleoptera, the antennæ of which are slender and setaceous, and their feet formed for swimming. See **COLEOPTERA**. Authors enumerate a great many species of this animal, among which is the great water-beetle, the largest of all european beetles, being an inch and an half in length, and all over of a deep and somewhat glossy black. See plate **LXXX**. fig. 3. n° 1. where two other species, marked n° 2. n° 3. are likewise delineated.





*Fig. 1. The GOLDEN - EAGLE.*



*Fig. 2. The WHITE-TAILED EAGLE.*



## E.

**E**, the fifth letter of the alphabet, and second vowel, has different pronounciations in most languages. The Greeks have their eta, η, and epsilon ε, or long and short *e*. The French have their *e* open, pronounced much like our *a* in the words *face* and *make*; their *e* masculine, pronounced not unlike our *y* at the end of words, as *liberté*, *liberty*; their *e* feminine, or mute, very weakly if at all pronounced, added generally at the end of words, either to distinguish the feminine gender, or lengthen the syllable; and their *e* before an *m* or *n*, which sounds like our *a* in the word *war*; these are all exemplified in the words *empêchée* or *enfermée*. In english there are three kinds of *e*, viz. the open or long *e*, as in the words *bear*, *wear*; the close or short *e*, as in *wet*, *kept*; and mute *e*, which serves to lengthen the syllable, as in *love*, *came*, &c.

As a numeral, E stands for 250. In music it denotes the tone *e-la-mi*. In the calendar it is the fifth of the dominical letters. And in sea-charts it distinguishes all the easterly points: thus, E. alone denotes east, E. by S. and E. by N. east by south and east by north. See the article CHARACTER.

**EADISH**, or **EDDISH**, among farmers. See the article EDDISH.

**EAGLE**, *aquila*, in ornithology, the english name of several species of the falcon-kind. See the article FALCON.

The iron-coloured eagle with a yellow cere, called by authors *chrysaetos*, is a large and terrible bird of prey, about the size of a turkey, frequent in many parts of Europe; the tongue of which is in shape like that of the human species. The brown or chestnut-coloured eagle, with a blue cere, is likewise a very bold and fierce bird.

The *chrysaetos*, or common eagle, is very rapacious; it will seize on lambs, and, during the time of its having young, scarce any thing is safe from it. See plate LXXXI. fig. 1.

The white-tailed eagle, brought from Hudson's bay, differs from the common kind in the colour of its tail, which is white, only that the tips of the feathers are black, or dark brown; the breast too

is spotted with triangular spots. See plate LXXXI. fig. 2.

To these may be added the *pygargus* and *haliaetus*. See the articles **PYGARGUS** and **HALIAETUS**.

In heraldry, the eagle is accounted one of the most noble bearings in armoury, and, according to the learned in this science, ought to be given to none but such as greatly excel in the virtues of generosity and courage, or for having done singular services to their sovereigns; in which cases they may be allowed a whole eagle, or an eagle naissant, or only the head or other parts thereof, as may be most agreeable to their exploits.

The reason why eagles are generally borne with their wings and tail expanded, is because this posture is best fitted to fill up the escutcheon. However, there are eagles borne in other postures, though not so common; all which will be explained under their respective articles. The arms of the emperor of Germany are, Or, a spread eagle with two heads, fable; diademed, langued, beaked, and membered, gules. Some authors express the two heads by the term displayed. The kingdom of Poland bears, Gules, an eagle, argent; crowned and membered, or.

Among the antients, the eagle was held sacred to Jupiter, and on that account placed on his scepter. Philostratus, in his *Themistocles*, says, the Medes and Lacedæmonians took it for their ensign of royalty; and it is well known that the Romans had the greatest respect for it, looking upon it as the talisman of their state, and taking it for their principal ensign. It was either of gold or silver, borne single on the point of a pike, till the time of Constantine, when the empire being divided into the eastern and western, the eagle was afterwards represented with two heads.

**EAGLE**, *aquila*, in astronomy. See the article **AQUILA**.

**EAGLE**, in architecture, a figure of that bird antiently used as an attribute of Jupiter, in the capitals and friezes of the columns of the temples consecrated to that god.

**EAGLE-FLOWER**, a name sometimes given to the balsamina. See **BALSAMINA**.

**EAGLE-OWL**, the same with the **bubo**, or great horned owl. See **BUBO**.

**EAGLE-STONE**, **ÆTITES**, in natural history. See the article **ÆTITES**.

**Black EAGLE**, an order of knighthood, instituted by the elector of Brandenburg, in 1701, on his being crowned king of Prussia.

The knights of this order wear an orange-coloured ribband, suspending a black eagle.

**White EAGLE**, a like order in Poland, instituted in 1325, by Uladislaus V, on occasion of the marriage of his son Casimir to the daughter of the great duke of Lithuania.

The knights of this order wear a chain of gold, suspending a silver eagle, crowned.

**White EAGLE** is also a term used by chemists for mercurius dulcis.

**Sea-EAGLE**, *aquila marina*, a fish of the ray kind. See the article **RAIA**.

**EAGLET**, a diminutive of eagle, properly signifying a young eagle. In heraldry, when there are several eagles on the same escutcheon, they are termed eaglets.

**EALDERMAN**, or **EALDORMAN**, the same with alderman. See **ALDERMAN**.

**EAR**, *auris*, in anatomy, the organ of hearing. See **HEARING**.

Anatomists divide the ear into three parts, the exterior, the middle, and the interior. The exterior part is called simply the auricle, but more properly *auris externa*. In this there are a great many eminences and cavities; as, the pinna and lobule; the helix and anthelix; and the tragus and antitragus; the scapha, which is a cavity between the helix and the anthelix behind; and the concha, which is a larger cavity, situated before the meatus auditorius, or passage into the internal ear: here are to be observed the glandulæ sebaceæ of Valsalva, which are mere cutaneous follicles: their substance is composed of the common integuments and a cartilage.

The muscles of the external ear are in human subjects very small, often scarce discernible; however, sometimes two, three, or more of them may be distinguished. These, from their situation, may be called the superior, the posterior, and the anterior. Their use in moving the ear is none at all, or very inconsiderable; their real use, as is supposed,

is to render the ear tense, when we would hear more distinctly. The course of the meatus auditorius is tortuous and oblique, turning chiefly towards the anterior parts. Its substance is partly bony, and partly cartilaginous: it is covered with an elastic membrane: the membrane investing its internal part is continuous with the cutis. In the convex part of this membrane, about the middle of the passage, are situated certain small glands, of a yellow colour, called glandulæ ceruminosæ: they serve to secrete the cerumen, which they deposit for various purposes in the passage.

The use of the external ear is to receive and convey sounds in the manner of an acoustic tube, in order to our hearing them more distinctly.

The middle part of the ear is called the tympanum: in this we are to observe the membrana tympani, which is situated at the extremity of the auditory passage. Its situation is very oblique inwards; its figure elliptic, and its surface concave. It is connected in its circumference with a ring of a bony substance in infants, which becomes afterwards transformed into the auditory passage, and in the middle it is connected with the little bone, called the malleus. Its substance is membranaceous, composed of two or three lamellæ, and is furnished with a vast number of blood-vessels.

Some authors mention a natural foramen, very small, and placed in an oblique direction, penetrating this membrane, and letting the smoke of tobacco, taken in at the mouth, find a passage thro' it out at the ears. The bony cavity of the tympanum is much smaller in human subjects than in quadrupeds. In this cavity are to be observed the periosteum, which is very thin, and furnished with a great number of blood-vessels; the chorda tympani, being a little nerve composed by a combination of ramuli, or little branches of the fifth and seventh pairs: this is extended in the manner of a cord, under the membrane of the tympanum. Here may be observed the three ossicula auditus, covered with the periosteum; these are called the malleus, the incus, and the stapes. The manubrium, or handle of the malleus, adheres to the membrane of the tympanum, and its head is articulated by a ginglymus with the body of the incus; and, finally, the longer leg of this is articulated, by arthrodia, with the head

head of the stapes : the stapes also, at its base, adheres to the fenestra ovalis, by means of a membrane.

The muscles of the malleus are two, an external and internal : the stapes has but one. The two fenestræ, or openings, are distinguished by the oval and the round ; the fenestra ovalis leads to the vestibule, on which stands the stapes ; the fenestra rotunda leads to the cochlea, and is closed by a membrane.

Besides the fenestræ, there are two other foramina, the one of these opens into the tube or duct of Eustachius, and terminates in the mouth, almost immediately behind the tonsils : this duct is partly bony, partly cartilaginous, and partly membranous, affording a communication between the mouth and the ears : the other of these foramina goes to the cellulæ of the mastoide processes. The third division, or the inner part of the ear, is generally termed the labyrinth : here are to be observed the vestibulum, being a cavity that forms the middle part of the labyrinth : the passage into this is the fenestra ovalis ; after which may be observed the three semicircular canals, distinguished by the names of the largest, the middle one, and the least, which open by five orifices into the vestibulum. The cochlea of the ear is placed opposite to these canals, and is in the manner of a snail-shell, forming two turns and a half in a spiral form. In this are to be remarked the nucleus and the canal, which is divided into two, by a spiral lamina : the upper of these opens into the vestibulum, and is called the scala vestibuli, and the lower, which terminates in the hollow of the tympanum, through the fenestra rotunda, is called scala tympani.

A very delicate and fine membrane carried along through the cavities of the labyrinth, is formed of an expansion of the auditory nerve, and is the primary part of the organ of hearing, just as the retina is formed of the expansion of the optic nerve, and is the primary organ of seeing. Next may be observed the auditory canal, which is distinguished into the common and proper ; the common is large, and has foramina in it, passing into the labyrinth ; the proper one is narrow and longer, terminating partly in the cavity of the cranium, and partly between the styloide and mastoide processes.

The nerves of the inner ear are, 1. from the auditory pair. 2. from the third pair of the vertebrals of the neck, but these are principally sent to the external ear. The arteries are from the carotids, both external and internal ; the veins run partly to the juglars, and partly to the sinuses of the dura mater.

**EAR-ACH**, a grievous pain in the auditory passage, proceeding from a sharp extravasated serum, affecting the nervous membrane which covers the meatus auditorius.

When this matter is translated to the external part, then the ear-ach arises, which, unless speedily appeased, may cost the patient his life.

The principal scope is to ease the pain, which may be done with nitrous and cinnabarine powders, and with emulsions of the greater cold seeds : but if these are ineffectual, recourse must be had to opiates, such as styraç pills, or the bare tincture. Outwardly lay a plaster to the temple of the affected side, composed of mastic, galbanum, saffron, expressed oil of nutmegs, and opium. Afterwards let the ear be held over the vapour of milk, with the fragrant and emollient spices : the smoke of tobacco, blown into the ear, is of great efficacy ; as also an infusion of millepedes in sallad oil.

**Closed meatus auditorius**. Sometimes the meatus auditorius is from the birth closed with a membrane, differing in degrees of thickness ; sometimes immediately after the birth, and sometimes a considerable while after. When this membrane closes the external ear, the faculty of hearing may be restored by making a cruciform incision in the occluding membrane, and keeping the passage open for some time with lint, or a tent ; but when the said membrane is seated very deep, it is best to divide it by a transverse or longitudinal incision, taking care that you do not at the same time wound the membrane of the tympanum which in infants is not seated so deep in the ear as in adults.

**Tubercles in the meatus auditorius**. Tubercles or fleshy excrescences in the auditory passage of the ears give great uneasiness, and do partly, if not wholly, obstruct the hearing. When they are not of long standing, they may be removed with escharotics ; or, as these are dangerous when they touch the membrane of the

tympanum, they may be extirpated by the scissars, or scalpel, when they are not seated too low in the ear. Lastly, it appears from the observations of Hildanus, (cent. iii. obs. 1.) and Purmannus, (chirurg. pag. 280.) that these tubercles may be frequently removed with success by ligature.

For other disorders of the ear, and for the method of extracting extraneous bodies fallen into it, see the articles **DEAFNESS**, **TINNITUS**, &c. and the article **EXTRACTION**.

**EAR**, among gardeners, a name given to the leaves that first appear from the seed, which differ considerably from other leaves. See the article **LEAF**.

**EAR-PICK**, an instrument of ivory, silver, or other metal, somewhat in form of a probe, for cleaning the ear.

The Chinese have a variety of these instruments, with which they are mighty fond of tickling their ears; but this practice, as Sir Hans Sloane judiciously observes, must be very prejudicial to so delicate an organ, by bringing too great a flow of humours on it.

**EAR-SHELL**, *auris marina*. See the article **AURIS**.

Small pearls are sometimes found in these shells, whereof there are several species. See the article **PEARL**.

**EAR-WIG**, *forficula*, in zoology. See the article **FORFICULA**.

**EARING**, in the sea-language, is that part of the bolt-rope which at the four corners of the sail is left open, in the shape of a ring. The two uppermost parts are put over the ends of the yard arms, and so the sail is made fast to the yard; and into the lowermost earings, the sheets and tacks are seized or bent at the clew.

**EARL**, a british title of nobility, next below a marquis, and above a viscount. Earls were antiently called *comites*, because they were wont *comitari regem* to wait upon the king for council and advice. The Germans call them *graves*, as landgrave, margrave, palgrave, rheingrave; the Saxons ealdormen, unless that title might be more properly applied to our dukes; the Danes, eorlas; and the English, earls. The title, originally, died with the man. William the conqueror first made it hereditary, giving it in fee to his nobles, and allotting them for the support of their state the third penny out of the sheriff's court, issuing out of all pleas of the shire whence they had

their title. But now the matter is quite otherwise; for whereas heretofore *comes* and *comitatus* were correlatives, and there was no comes or earl, but had a county or shire for his earldom, of latter years the number of earls increasing, and no more counties being left, divers have made choice of some eminent part of a county, as Lindsey, Holland, Cleveland, &c. some of a lesser part, as Stafford, &c. others have chosen for their title some eminent town, as Marlborough, Exeter, Bristol, &c. and some have taken for their title the name of a small village: their own seat or park, as Godolphin, Clarendon, &c. An earl is created by cincture of sword, mantle of state put upon him by the king himself, a cap and a coronet put upon his head, and a charter in his hand. All the earls of England are denominated from some shire, town or place, except three; two of whom, *viz.* earl Rivers, and earl Paulet, take their denomination from illustrious families: the third is not only honorary, as all the rest, but also officary, as the earl marshal of England.

**EARL marshal of England**, is a great officer who had antiently several courts under his jurisdiction, as the court of chivalry, and the court of honour. Under him is also the herald's office or college of arms. He hath some pre-eminence in the court of Marshalsea, where he may sit in judgment against those who offend within the verge of the king's court. This office is of great antiquity in England, and antiently of greater power than now; and has been for several ages hereditary in the most noble family of Howard.

**EARNEST**, *arrhe*, money advanced to bind the parties to the performance of a verbal bargain. By the civil law, he who recedes from his bargain loses his earnest, and if the person who received the earnest give back, he is to return the earnest double. But with us, the person who gave it, is in strictness obliged to abide by his bargain; and in case he decline it, is not discharged upon forfeiting his earnest, but may be sued for the whole money stipulated.

**EARTH**, *terra*, in physiology, a fossile, or terrestrial matter, whereof our globe partly consists.

Earths are either simple or compound. The simple earths are friable, opaque, insipid bodies, not inflammable, vitri-fiable,

fiable by extreme heat, diffusible in water, and separable from it by filtration. Of these we have five genera or kinds, *viz.* boles, clays, marles, ochres, and tripelas. See **BOLES**, **CLAYS**, **MARLES**, &c.

The compound earths are composed of argillaceous or marley particles separated and divided by adventitious matter, and never free from these mixtures, or in the state of pure earths. Of these we have four genera, two of loams, *viz.* thraustomicthes, and glischromicthes; and two of moulds, *viz.* thruptomicthes, and gloromicthes. See the articles **LOAMS**, **MOULDS**, **THRAUSTOMICHTHES**, **THRUPTOMICHTHES**, &c.

Besides these earths, there are frequently found in digging a kind of terræ miscellanæ, of no determinate species, nor to be known by any peculiar name, being composed of masses of different sizes, of different species of earths, broken off from their strata, soon after their formation, and blended together at the time of the original subsidence of the strata. As for chian, eretrian, lemnian, and maltese earths, together with all the sealed earths which are the subjects of the materia medica. See the articles **BOLE**, **CLAY**, **MARL**, &c.

**EARTH**, in gardening and husbandry, if good, should be of a blackish colour, gravelly, fat, pliant, or easy to be digged; it should be neither cold nor light, it ought to have no ill smell or taste, and it should be of the same quality three or four feet deep for trees, which if they have not that depth, will languish and decay after they have been planted six years. Fruit trees will thrive in a less depth, and they generally produce the most generous fruits, when their roots spread near the surface of the earth.

Husbandmen call that new earth which lying three or more feet deep, never served to the nourishment of any plant; or earth that has been a long time built upon, though it had formerly bore; earth likewise of a sandy loamy nature, where cattle have been a long time fed, may be accounted such, and be of excellent use for most sorts of plants, especially if it has been thrown up in heaps to grow richer.

**EARTH**, in chemistry, is used for a principle or element, in the composition of bodies, entering them either as an ingredient, or giving them a power of performing various operations in nature and art. It is a body, as having three dimensions

impenetrability, figurability, and its own particular gravity. In weight it exceeds water, salts, and the spirits of animals and vegetables. When pure, or perfectly separated from other bodies, it is consistent, hard, and fine, though brittle with regard to our senses, and easily reducible by trituration into a certain powder, in which respect it differs from the true metals and gems; though still more in this, that it remains fixed and unchanged in the most violent fire, even so far as not to flow therein.

Boerhaave says, he never could obtain elementary earth from metals, but it may be obtained from water, from calcined vegetables, from smoak and soot, from putrified animals, from distilled animal fluids, from fossile salts, and from fluid and solid sulphurs. Whence he concludes, that the same simple elementary earth contributes as a constituent principle to form the particular corporeal fabric of animals, vegetables, and some fossils of a less permanent and less simple nature, and in them all serves as a firm basis to their form, whilst it unites the other principles to itself, and to one another, so as to constitute one determinate individual. Hence also, says he, the property of assimilating other substances into the nature of every body that receives nutriment, and consequently the seminal property of producing their like, is principally owing to the efficacy of this earth; for their properties no longer remain after the particular texture depending principally upon the earth is destroyed, or wanting in any body.

**EARTH**, in astronomy and geography, one of the primary planets, being this teraqueous globe whereon we inhabit.

*Figure of the EARTH* was accounted by some of the antients to be like that of an oblong cylinder; by others, of the form of a drum, and by others to be flat. The moderns demonstrate it to be nearly spherical from the following, among other considerations. 1. All the appearances of the heavens, both at land and at sea, are the same as they would be if the earth were a globe. 2. In eclipses of the moon which are caused by the shadow of the earth falling upon the moon, this shadow is always circular, and a body can be no other than a globe, which in all situations casts a circular shadow. 3. Several navigators have sailed quite round the globe, steering their course directly south and west till they came to the

magellanic sea, and from thence to the north and west, till they returned to their port from the east; and all the phenomena which should naturally arise from the earth's rotundity, happened to them. Besides, their method of sailing was also founded upon this hypothesis, which could never have succeeded so happily, if the earth had been of any other figure. It is true, the surface of the earth is not an exact geometrical globe, but then the inequalities are so inconsiderable, that the highest mountain bears no greater proportion to the bulk of the earth, than a grain of dust does to a common globe. The figure of the earth then was reckoned by mathematicians and geographers as perfectly spherical, excepting the small inequalities in its surface, of mountains and vallies, till an accident engaged the attention of Sir Isaac Newton, and Mr. Huygens, who demonstrated from the laws of hydrostatics, and the revolution of the earth about its axis, that its figure was not a true sphere, but an oblate spheroid flattened towards the poles. Monsieur Richer, when at the island of Cayenne, about five degrees distant from the equator, found that his clock, which at Paris kept true time, now lost two minutes and twenty-eight seconds every day. Now, though heat will lengthen pendulums, and consequently retard their motion, it is certain the heats of Cayenne were not sufficient to solve this phenomenon, which can flow only from a diminution in the pressure of gravity. For, as the earth revolves about its axis, all its parts will endeavour to recede from the axis of motion, and thereby the equatorial parts where the motion is quickest will tend less towards the center than the rest; their endeavour to fly off from the axis about which they revolve, taking off part of their tendency that way; so that those parts will become lighter than such as are nearer the poles. The polar parts, therefore, will press in towards the center, and raise the equatorial parts, till the quantity of matter in the latter is so far increased as to compensate for its lightness, and an equilibrium be restored. On which account, the form which the earth assumes will be that of an oblate spheroid, whose shorter axis passes thro' the poles. By virtue only of the rotation of the earth about its axis, the weight of bodies at the equator is less than at

the poles, in the proportion of 288 to 289. From hence arises, as before observed, a spheroidal form of the earth, and from that spheroidal form arises another diminution of gravity at the equator, by which, if the earth were homogeneous throughout, bodies at the equator would lose one pound in 1121, and so on both accounts taken together, the gravity of bodies at the poles would be to the same at the equator as 230 to 229. From whence, if we suppose the gravity of bodies within the earth to be directly as their distance from the center, those numbers will also express the relation between its polar and equatorial diameter. This is upon a supposition that the earth was at first fluid, or a chaos, having its solid and fluid parts confusedly mixed together; but if we suppose it at first partly fluid and partly dry, as it now is, since we find that the land is very nearly of the same figure with the sea, except raised a little to prevent its being overflowed, the earth must still be of the same form; for otherwise the major part of the water would flow towards the equator, and spread itself like an inundation over all the land in those parts. This theory met with great opposition from Monsieur Cassini, who having measured the meridian of France, declared (with great reason likewise if the observations had been correct) that the earth, instead of being flattened, was lengthened towards the poles, that is, instead of being an oblate, it was an oblong spheroid, higher at the poles by about ninety-five miles. So wide a difference, between philosophers of so high rank, determined at length the king of France, at an expence becoming a monarch, to employ two companies of mathematicians, the one to measure the length of a degree of the meridian at the equator, and the other the length of a degree at the polar circle, that by comparing them together, and with the length of the degree of France, it might be known whether the earth were oblong or flat towards the poles.

It is certain, if the lengths of the degrees of latitude decrease, as we go from the equator towards the poles, than the axis is greater, and the figure an oblong spheroid; but on the contrary, if these lengths increase, as you remove towards the poles, the axis is less than a diameter at the equator, and consequently the figure an oblate spheroid.

This



This last appears, by the respective mensurations of these mathematicians (as it did before by the theory of Sir Isaac Newton) to be the true figure; the result of their operations, which were performed with a surprising degree of exactness, being as follows. The measure of a degree of the meridian in the latitude of  $66^{\circ} 20'$ , was found to be 57437  $\frac{2}{5}$  toises, and in the latitude of  $49^{\circ} 21'$  only 57183 toises; for the observations of Mr. Cassini have been corrected by some gentlemen of the french academy, since the return of the academicians from the north. Now supposing those degrees accurately measured, the axis or diameter that passes through the poles will be to the diameter of the equator, as 177 to 178, and hence the earth will be twenty-two miles higher at the equator than at the poles. The length of a degree of the meridian under the equator, was found to be 56767 toises, and by reducing it to the level of the sea, 56746 toises. But as the heat must needs have produced some variation in the length of the toise that was used, when this correction is made, the length of a degree was found to be 56753 toises, and the ratio of the axis of the earth to the diameter of the equator, that of 178 to 179; whence it follows that the earth is oblate, or flated a 179th part towards the poles. Hence the length of the degrees of the meridian in any latitude are determined, for which we refer to the article DEGREE. If any one is desirous of being informed of the methods observed in performing these mensurations at the equator, and the arctic circle, let him consult Mr. Maupertuis's figure of the earth determined, with Mr. Murdoch's translation, and the book lately published by Mr. Bouguer and Condamine.

*Density of the EARTH.* See *quantity of matter in the EARTH*, infra.

*Geographical divisions of the EARTH*, comprehend, 1. Its natural divisions, as continent, island, peninsula, ocean, lake, gulph, &c. 2. Its political divisions, as empire, kingdom, province, city, Germany, Britain, Middlesex, London, &c. 3. The ecclesiastical divisions, as archbishopric, diocese, parish, &c. See the articles CONTINENT, ISLAND, &c.

*Magnetism of the EARTH.* Dr. Knight thinks the earth may be considered as a great loadstone, whose magnetical parts are disposed in a very irregular manner,

and that the south pole of the earth is analogous to the north pole in magnets; that is, the pole by which the magnetical stream enters. He observes, that the earth might become magnetical by the iron-ores it contains, and notwithstanding it might have remained unmagnetical, unless some cause had existed capable of making that repellent matter producing magnetism move in a stream thro' the earth, yet he thinks that such a cause does really exist. For if the earth revolves round the sun in an ellipsis, and the south pole of the earth is directed towards the sun at the time of its descent, a stream of repellent matter will thereby be made to enter at the south pole, and come out at the north. And he suggests, that the earth's being in its perihelion in the winter, may be one reason why magnetism is stronger in this season than in summer. Hence also the doctor thinks it probable, that the earth's magnetism has been improving since the creation, and that this may be one reason why the use of the compass was not discovered sooner. See the article MAGNET.

*Motion of the EARTH.* The earth has a triple motion. 1. A *diurnal motion* round its own axis, from west to east, in twenty-four hours, which occasions the perpetual succession of days and nights. It is agreeable to reason that the earth should revolve about its axis to account for the appearance of such a vast number of stars which seem to perform their revolutions round the earth in twenty-four hours; for the motion of these stars, were it real, would be incredibly swift and beyond all imagination, because their distance in respect of us, is almost infinite, and the orbit they have to run round so prodigiously great, that they must move at least 100,000 miles in a minute. See the articles DIURNAL and COPERNICAN System.

2. An *annual motion* round the sun in a year, which produces the different seasons, and the lengthening and shortening of days. We have, under the article COPERNICAN System, demonstrated that the earth moves round the sun: we shall here explain the phenomena that arise from that motion, in conjunction with the rotation round its axis, having first premised that the earth in its annual motion has its axis always in the same direction, or parallel to itself. See the article PARALLELISM.

Suppose

Suppose  $\varphi$   $\varphi$   $\varphi$   $\varphi$  (plate LXXXII. fig. 1.) the earth's orbit, and S the sun. Thro' the center of the sun draw the right line  $\varphi$  S  $\varphi$  parallel to the common section of the equator and the ecliptic, which will meet with the ecliptic in two points  $\varphi$   $\varphi$ . And when the earth seen from the sun is in either of the points  $\varphi$  or  $\varphi$ , a right line S  $\varphi$  or S  $\varphi$ , joining the center of the earth and sun, will coincide with the common section of the equator and ecliptic, and will then be perpendicular to AB, the axis of the earth, or of the equator, because it is in the plane of the equator. But the same line is also perpendicular to the circle which bounds the light and darkness, and therefore the axis of the earth will be in the plane of that circle, which will therefore pass through the poles of the earth, and will cut the equator and all its parallels into equal parts. When the earth, therefore, is in the beginning of  $\varphi$ , the sun will be seen in  $\varphi$ , in the common section of the equator and ecliptic, in which position, the circle of illumination touches both poles; the sun is vertical to the equator, and the days and nights are equal all the world over: and this will be the spring season, or vernal equinox. See the article EQUINOX.

The earth in its annual motion going through  $\varphi$ ,  $\varphi$ , and  $\varphi$  towards  $\varphi$ , and the common section of the equator and the ecliptic remaining always parallel to itself, it will no longer pass through the body of the sun; but, in  $\varphi$ , it makes a right angle with the line SP, which joins the centers of the sun and earth. And because the line SP is not in the plane of the equator, but in that of the ecliptic, the angle BPS, which the axis of the earth BA makes with it, will not now be a right angle, but an oblique one of  $66\frac{1}{2}$  degrees, which is the same with the inclination of the axis to the plane of the ecliptic. Let the angle SPL be a right angle, and the circle bounding light and darkness, will pass through the point L, and then the arch BL, or the angle BPL, will be  $23\frac{1}{2}$  degrees, that is, equal to the complement of the angle BPS to a right angle. Let the angle BPE be a right angle, and then the line PE will be in the plane of the equator. Therefore, because the arches BE and LT are equal, each of them being quadrants; if the common arch

BT be taken away, there will remain TE equal to LB, equal to  $23\frac{1}{2}$  degrees. Take EM equal to ET, and through the points M and T describe two parallel circles TC, MN; the one represents the tropic of cancer, and the other the tropic of capricorn. And the earth being in this situation, the sun will approach the nearest that it can come to the north pole: he will shine perpendicularly on the point T, and consequently will be vertical to all the inhabitants under the tropic of cancer, when he comes to their meridians. It is manifest that the circle which bounds light and darkness, reaches beyond the north pole B to L; but towards the south it falls short to the south pole A, and reaches no further than F. Through L and F, let two parallels to the equator be described. These will represent the polar circles, and while the earth is in P, all that tract of it which is included within the polar circle KL continues in the light, notwithstanding the constant revolution round the axis. On the contrary, those that lye within the antarctic circle remain in continual darkness. Besides, it is also manifest, that all the parallels between the equator and the arctic circle, are cut by the circle bounding light and darkness into unequal portions, the largest portions of these circles remaining in the light, and the smallest in darkness; but these parallels which are towards the antarctic circle have their greatest portions in darkness, and their least in light; and the difference of these portions will be greater or less, according as the circles are nearer to the pole, or to the equator. Therefore, when the sun is seen in cancer  $\varphi$ , the inhabitants of the northern hemisphere will have their days at the longest, and their nights at the shortest, and the season of the year will be summer. The contrary of this will happen to the inhabitants of the southern hemisphere. As the earth moves on from  $\varphi$  by  $\varphi$ ,  $\varphi$ , the north pole returns, the diurnal arches begin gradually to decrease, and the nocturnal to increase, and of consequence, the sun's rays will fall more and more obliquely, and his heat proportionably diminishes, till the earth comes to  $\varphi$ , when the sun will appear in  $\varphi$ , at which time, the days will again be equal to the nights to all the inhabitants of the earth, the circle bounding light

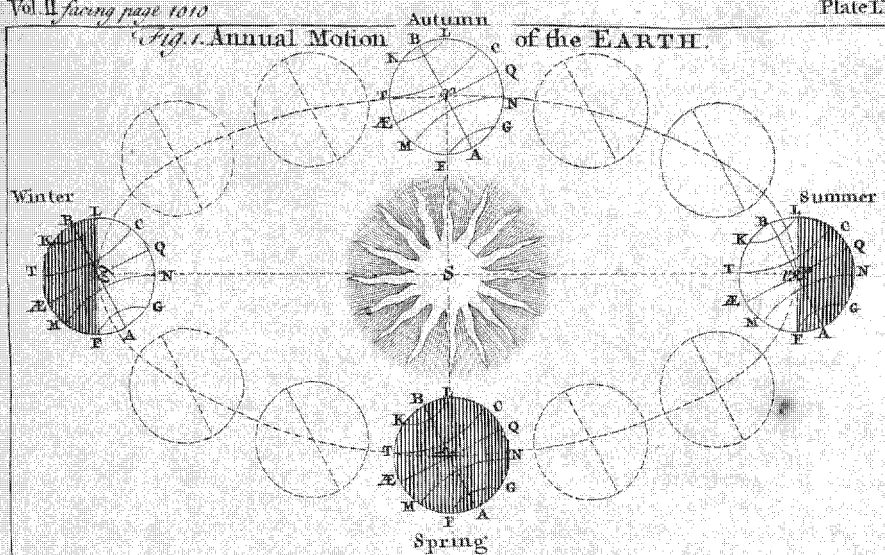


Fig. 2. ECHINOPS, GLOVE-THISTLE.

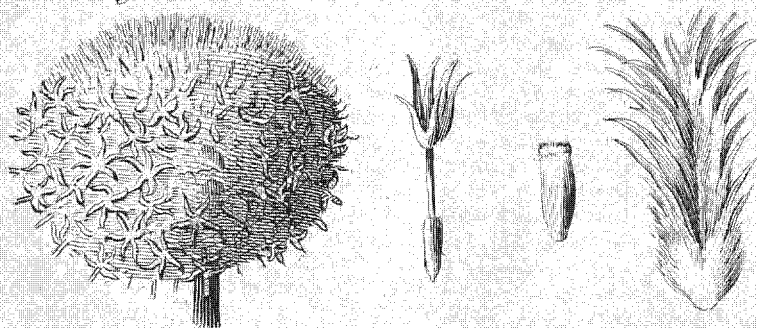


Fig. 3. ECHIUM, VIPER'S BUGLOSS.

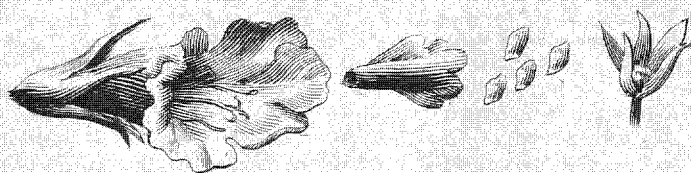
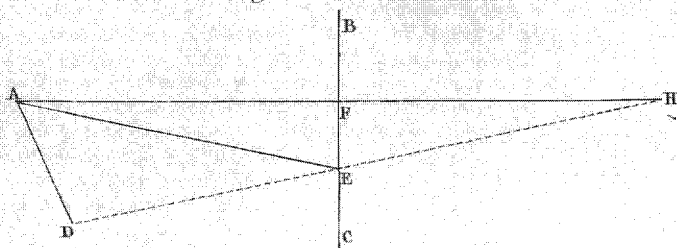


Fig. 4. ECHO.





light and darkness passing, in this position, through the poles. This will be the season called autumn.

The earth moving on through  $\gamma$   $\delta$  and  $\Pi$ , the sun will be seen to go in the ecliptic through  $\alpha$   $\eta$  and  $\delta$ , and will appear to decline from the equator, towards the south, so that when the earth is really in  $\alpha$ , the sun will appear in  $\delta$ . And whereas the axis AB always retains its parallelism, the earth will have the same position and aspect in respect to the sun, that it had when it was in  $\delta$ ; but with this difference, that when the tract within the polar circle KL was in continual light while the earth was in  $\delta$ ; now the earth arriving at  $\alpha$ , that same tract will be altogether in darkness: but the opposite space within the circle FG, will be in a continual illumination, and at the pole A there will be no night for the space of six months. Here likewise of the parallels between the equator and the north pole, the illuminated portions are much less than the portions which remain in darkness, the contrary of which happened in the former position, so likewise the sun at mid-day will appear vertical to all the inhabitants that live in the tropic MN; so that it will appear to have descended towards the south from the parallel TC, to the parallel MN, through the arch CQN, which is forty-seven degrees. This will be the season called winter.

Lastly, as the earth journeys on from cancer through  $\Omega$  and  $\mu$  to  $\alpha$ , the sun appears to pass through  $\omega$  and  $\chi$  to  $\gamma$ , and the northern climes begin to return, and receive more directly the enlivening beams of the sun, whose meridian height does now each day increase; the days now lengthen, and the tedious nights contract their respective arches; and every thing conspires to advance the delightful season of the spring, with the equality of days and nights, as was shewn when the earth was in libra, from which point we began to trace its motion. *Keill.*

By the third motion of the earth, we mean that motion by which the poles of the world revolve about the poles of the ecliptic, and occasion what is commonly called the precession of the equinoxes, or more properly, the retrogression of the earth's nodes. See the article PRECESSION of the equinoxes.

As to the velocity of the earth's motion, and the figure and time in which it performs a revolution round the sun. See the articles PERIOD and ORBIT.

*Quantity of matter in the EARTH.* This arduous problem can only be solved by the principles of gravitation. We know the force of gravity towards our earth by the descent of heavy bodies, or by calculating how much the moon falls below the tangent of her orbit: also by computing, from their motions, how much a primary planet falls below its tangent in a given time, and how much any of Jupiter's and Saturn's satellites fall below their tangents in the same time, we are able to determine the proportion which the gravity of a primary planet to the sun, and of a satellite towards its primary, bears to the gravity of the moon towards the earth, in their respective distances. Then, from the general law of the variation of gravity, the forces that would act upon them at equal distances from the sun, Jupiter, Saturn, and the earth are computed; which give the proportion of the quantities of matter contained in these different bodies; that is, if we suppose the matter of the sun to be 1, the quantities of matter in Jupiter, Saturn, and the earth will be respectively  $\frac{1}{1067}$ ,  $\frac{1}{3021}$ ,

$\frac{1}{189237}$ . *Maclaurin.*

The quantities of matter in these bodies being thus determined, and their bulk being known from astronomical observations, it is easy to compute their different densities. Thus, the densities of the sun, Jupiter, Saturn, and the earth have been computed to be respectively as the numbers 100,  $94\frac{1}{2}$ , 67, and 400.

*Theory of the EARTH.* The earth in its natural and original state Des Cartes, Burnet, Woodward, and Whiston, suppose to have been perfectly round, smooth, and equable; and they account for its present rude and irregular form principally from the great deluge. See the article DELUGE.

Mr. de Bufon arguing from the spheroidal figure of the earth, and the laws of hydrostatics, supposes that the earth, as well as the other planets, are parts struck off from the body of the sun by the collision of comets, and consequently, when the earth assumed its form, it was in a state of liquefaction by fire. Of this, says he, we will be the more easily convinced, when we consider the nature of the

the matter contained in the body of the earth, the greatest part of which, as sand and clays, are vitrified, or vitrifiable substances; and, on the other hand, when we reflect upon the impossibility of the earth's being ever in a state of fluidity produced by water, since there is infinitely more land than water; and, besides, water has not the power of dissolving sand, stones, and other substances of which the earth is composed. How far the inequalities in the face of the earth, the beds of rivers, lakes, &c. and the various strata in its internal parts, serve to confirm this hypothesis, may be seen in *Histoire Naturelle*, &c. tom. 1. by M. de Bufon, and in the articles MOUNTAIN, RIVER, STRATA, &c.

*Latitude of the EARTH.* See LATITUDE.

*Longitude of the EARTH.* See LONGITUDE.

EARTH-BAGS, *sacs a terre*, in fortification.

See the article SAND-BAGS.

EARTHING, in agriculture and gardening, signifies the covering of shrubs and plants, as vines, celery, &c. with earth.

EARTHQUAKE, in natural-history, a violent agitation or trembling of some considerable part of the earth, generally attended with a terrible noise like thunder, and sometimes with an eruption of fire, water, wind, &c.

*Causes of EARTHQUAKES.* Earthquakes and vulcanos are both produced from the same cause, which may be thus explained. Those countries which yield great store of sulphur and nitre, or where sulphur is sublimed from the pyrites, are by far the most injured and incommoded by earthquakes; for where there are such mines, they must send up exhalations, which meeting with subterraneous caverns, must stick to the arches of them, as soot does to the sides of our chimnies; where they mix themselves with the nitre or saltpetre which comes out of these arches, in like manner as we see it come out of the inside of the arch of a bridge, and so makes a kind of crust which will very easily take fire.

There are several ways by which this crust may take fire, *viz.* 1. By the inflammable breath of the pyrites, which is a kind of sulphur that naturally takes fire of itself. 2. By a fermentation of vapours to a degree of heat, equal to that of fire and flame. 3. By the falling of some great stone which is undermined by water, and striking against another, produces some sparks that set fire to the neighbouring combustible matter, which

being a kind of natural gunpowder, at the appulse of the fire goes off with a sudden blast or violent explosion, rumbling in the bowels of the earth, and lifting up the ground above it, so as sometimes to make miserable havock and devastation, till it gets vent or a discharge. Burning mountains and vulcanos, are only so many spiracles serving for the discharge of this subterranean fire, when it is thus preternaturally assembled. And where there happens to be such a structure and confirmation of the interior parts of the earth, that the fire may pass freely and without impediment from the caverns therein, it assembles into these spirals, and then readily and easily gets out from time to time without shaking or disturbing the earth. See the article VULCANO.

But where a communication is wanting, or the passages are not sufficiently large and open, so that it cannot come at the said spiracles without first forcing and removing all obstacles, it heaves up and shocks the earth, till it hath made its way to the mouth of the vulcano; where it rusheth forth, sometimes in mighty flames, with great velocity, and a terrible bellowing noise. Earthquakes are sometimes confined to a narrow space, which is properly the effect of the re-action of the fire; and they shake the earth just as the explosion of a powder-magazine causes a sensible concussion at the distance of several leagues. Thus a violent eruption of Etna, will cause an earthquake over all the island of Sicily; but it will never extend to the distance of three or four hundred leagues. In like manner, when some new vents of fire have been formed in mount Vesuvius, there are felt at the same time earthquakes at Naples, and in the neighbourhood of the vulcano; but these concussions have never shaken the Alps, nor been communicated to France, or other countries remote from Vesuvius.

Sometimes they are felt at considerable distances, and shake a long tract of ground without any eruption or vulcano appearing. We have instances of earthquakes which were felt at the same time in England, France, Germany, and even in Hungary, and these extend always a great deal more in length than in breadth; they shake a tract of ground with more or less violence in different places, in proportion as it is remote from the fire; and they are almost always accompanied with a dull noise like that of a heavy carriage rolling along with great rapidity.

See

See Phil. Tr. n° 157. Woodward's Essay, and M. de Buffon's Hist. Nat. &c.

**Dreadful effects of EARTHQUAKES.** Catania, a city of Sicily, which was almost totally destroyed in the year 1693, is a melancholy instance of the dreadful effects of earthquakes. The shock was not only felt all over Sicily, but likewise in Naples and Malta; and it was so violent, that people could not stand upon their legs; and those who lay on the ground, were tossed from side to side, as if on a rolling billow. The earth opened in several places, throwing up large quantities of water; and great numbers perished in their houses by the fall of rocks that were rent from the mountains. The sea was violently agitated, and roared dreadfully: mount Etna threw up vast spires of flame, and the shock was attended with a noise exceeding the lowdest claps of thunder. Fifty-four cities and towns, with an incredible number of villages, were either destroyed or greatly damaged; and it was computed that near 60,000 persons perished in different parts of the island, of whom 18,000 were inhabitants of Catania. In 1746, the city of Lima, and port of Callao in Peru, suffered prodigiously from an earthquake. All the buildings of Callao, except one tower, were sunk in the sea, and consequently all the inhabitants drowned: of five and twenty ships that were in the port, four were carried a league up the country, and the rest swallowed up by the waves. At Lima, which is a pretty large city, only seven and twenty houses remained standing: a great number of people were crushed to death, especially monks and nuns, because their monasteries were higher, and built of more solid materials than the other houses. The shock lasted fifteen minutes. See an account of a terrible earthquake that happened at Jamaica in 1692, in Phil. Tr. n° 209, and an account of other earthquakes in n° 462, 463. See also Buffon's Hist. Nat. tom. 1.

**EASE**, among sailors. See **EASING**.

**EASEL-PIECES**, a denomination given by painters to such pieces as are contained in frames, in contradistinction from those painted on ceilings, &c.

**EASEMENT**, in law, a privilege or convenience which one neighbour has of another, whether by charter or prescription, without profit: such are a way through his lands, a sink, or the like. These, in many cases, may be claimed.

**EASING**, in the sea-language, signifies the

slackening a rope, or the like: thus, to ease the bow-line or sheet, is to let them go slack; to ease the helm, is to let the ship go more large, more before the wind, or more larboard.

**EASLOW**, a borough of Cornwall, twenty-two miles south of Launceston, which sends two members to parliament.

**EAST**, one of the four cardinal points of the world; being that point of the horizon, where the sun is seen to rise when in the equinoctial. See **COMPASS**, **HORIZON**, **EQUINOCTIAL**, &c.

**EAST** is also frequently compounded with other words, as east-indies, east-dial, east-wind, &c. to signify their being situated towards the east. See the articles **INDIES**, **DIAL**, **WIND**, &c.

**EASTER**, a festival of the christian church, observed in memory of our Saviour's resurrection.

The Greeks call it *πασχα*, the Latins, *pascha*, an hebrew word signifying *passage*, applied to the jewish feast of the passover, to which the christian festival of easter corresponds. It is called easter in the English, from the goddess Eostre, worshiped by the Saxons with peculiar ceremonies in the month of April. See the article **PASSOVER**.

The observation of this festival, is as ancient as the very time of the apostles. In the primitive ages of the church, there were very great disputes about the particular time when this festival was to be kept. The asiatic churches kept their easter upon the very same day the Jews observed their passover; and others, on the first Sunday after the first full moon in the new year. This controversy was determined in the council of Nice, when it was ordained that easter should be kept upon one and the same day, which should always be a Sunday in all christian churches throughout the world.

But though the christian churches differed as to the time of celebrating easter, yet they all agreed in shewing particular respect and honour to this festival: hence, in ancient writers, it is distinguished by the name of *dominica gaudii*, i. e. Sunday of joy. On this day prisoners and slaves were set free, and the poor liberally provided for. The eve, or vigil, of this festival was celebrated with more than ordinary pomp, which continued till midnight, it being a tradition of the church that our Saviour rose a little after midnight; but in the east, the vigil lasted till cock-crowing.

It was in conformity to the custom of the Jews, in celebrating their passover on the fourteenth day of the first month, that the primitive fathers ordered that the fourteenth day of the moon, from the calendar new moon, which immediately follows the twenty-first of March, at which time the vernal equinox happened upon that day, should be deemed the paschal full moon, and that the Sunday after should be easter-day; and it is upon this account that our rubric has appointed it upon the first Sunday after the first full moon immediately following the twenty-first day of March. Whence it appears, that the true time for celebrating easter, according to the intention of the council of Nice, was to be the first Sunday after the first full moon following the vernal equinox, or when the sun entered into the first point of aries; and this was pope Gregory's principal view in reforming the calendar, to have easter celebrated according to the intent of the council of Nice. Having first found the epact and dominical letter, according to the method delivered under these articles, easter-day may be found by the two following rules.

1. To find easter-limit, or the day of the paschal full moon, counting from March 1 inclusive, the rule is this: add 6 to the epact, and if this sum exceeds 30, take 30 from it; then from 50 subtract this remainder, and what is left will be the limit; if the sum of the epact, added to 6, does not amount to 30, it must be subtracted from 50, and the remainder is the limit required; which is never to exceed 49, nor fall short of 21.
2. From the limit and dominical letter, to find easter-day: add 4 to the domini-

cal letter; subtract this sum from the limit, and the remainder from the next higher number, which contains 7 without any remainder; lastly, add this remainder to the limit, and their sum will give the number of days from the first of March to easter-day, both inclusive.

Thus, to find easter-day for the year 1754, for instance. First find the epact 6, which added to 6 gives 12; and as this sum does not amount to 30, it must be subtracted from 50, and the remainder 38 is the limit. Then adding 4 to 6, the number of the dominical letter F, subtract this sum, *viz.* 10, from the limit 38, and the remainder 28 from 35, the next superior number that contains 7 a certain number of times without any remainder, and there remains 7, which being added to the limit 38, gives 45 for the number of days from the first of March to easter-day, both inclusive: hence, allowing 31 for March, there remains the 14th of April for easter-day. Here follows the operation at length.

$$6 + 6 = 12$$

$$50 - 12 = 38 = \text{paschal limit}$$

$$\text{Dominical letter F} = 6$$

$$6 + 4 = 10, \text{ and } 38 - 10 = 28; \text{ then}$$

$$35 - 28 = 7. \text{ And}$$

$$38 + 7 = 45; \text{ from which subtracting}$$

$$31, \text{ the number of days in March}$$

$$14 \text{ there remains } 14, \text{ the day of}$$

April answering to easter-day for the year 1754.

However, to save the trouble of calculation, we shall here give a table, by which easter-day may be found by inspection till the year 1900, according to the gregorian or new style.

Golden Number.	Dominical Letters.						
	A.	B.	C.	D.	E.	F.	G.
I. April 16	17	18	19	20	14	18	
II. April 9	3	4	5	6	7	8	
III. March 26	27	28	29	23	24	25	
IV. April 16	17	11	12	13	14	15	
V. April 2	3	4	5	6	March 31	April 1	
VI. April 23	24	25	19	20	21	22	
VII. April 9	10	11	12	13	14	8	
VIII. April 2	3	March 28	29	30	31	April 1	
IX. April 16	17	18	19	20	21	22	
X. April 9	10	11	5	6	7	8	
XI. March 26	27	28	29	30	31	25	
XII. April 16	17	18	19	13	14	15	
XIII. April 2	3	4	5	6	7	8	
XIV. March 26	27	28	22	23	24	25	
XV. April 16	10	11	12	13	14	15	
XVI. April 2	3	4	5	March 30	31	April 1	
XVII. April 23	24	18	19	20	21	22	
XVIII. April 9	10	11	12	13	7	8	
XIX. April 2	March 27	28	29	30	31	April 1	



As to the use of this table, easter-day will be found in the common angle of meeting of the given dominical letter and the golden number; the name of the month lying in a direct line with it, towards the left hand.

**EASTERN**, an appellation given to whatever relates to the east: thus we say, eastern amplitude, eastern church, &c. See **AMPLITUDE**, **CHURCH**, &c.

**EATON**, a town of Buckinghamshire, situated on the north side of the Thames, opposite to Windsor, and famous for its collegial school founded by king Henry VI. being a seminary for king's college Cambridge, the fellows of which are all from this school.

**EAVES**, in architecture, the margin or edge of the roof of an house; being the lowest tiles, slates, or the like, that hang over the walls, to throw off water to a distance from the wall. See the articles **WALL** and **ROOF**.

**EAVES-LATH**, a thick feather-edged board, generally nailed round the eaves of a house for the lowermost tiles, slates, or shingles to rest on.

**EBBING** of the tides. See **TIDE**.

**EBDOMARIUS**, in ecclesiastical writers, an officer formerly appointed weekly to superintend the performance of divine service in cathedrals, and prescribe the duties of each person attending in the choir, as to reading, singing, praying, &c.

**EBENUS**, the **EBONY-TREE**. See the article **EBONY**.

**EBIONITES**, in church-history, heretics of the first century, so called from their leader Ebion.

They held the same errors with the Nazareens, united the ceremonies of the mosaic institution with the precepts of the gospel, observed both the Jewish sabbath and Christian Sunday, and in celebrating the eucharist, made use of unleavened bread. They abstained from the flesh of animals, and even from milk. In relation to Jesus Christ, some of them held that he was born, like other men, of Joseph and Mary, and acquired sanctification only by his good works. Others of them allowed, that he was born of a virgin, but denied that he was the word of God, or had any existence before his human generation. They said, he was, indeed, the only true prophet, but yet a mere man, who by his virtue had arrived at being called Christ, and the son of God. They also supposed, that Christ and the devil were two principles, which

God had opposed to each other. Of the New Testament, they only received the gospel of St. Matthew, which they called the gospel according to the Hebrews. See the article **NAZAREENS**.

**EBLIS**, the name used by the mahometans for the devil. See the article **DEVIL**.

**EBONY**, *ebenus*, in botany, a tree supposed to be of the palm-kind, the wood of which is imported from different countries of the East and West-Indies.

Its wood is extremely solid, and capable of a fine polish; and, therefore, much used in toys and marquetry.

**EBRBUHARITES**, a kind of mahometan monks, so called from their founder Ebrbuhar.

They make great profession of piety, and contempt of the world; but are accounted heretics by the rest of the mahometans, because they believe themselves not obliged to go in pilgrimage to Mecca.

**EBRILLADE**, in the manege, a check of the bridle given to the horse by a jerk of one rein, when he refuses to turn. Some confound the ebrillade with the *saccade*. See the article **SACCADE**.

As the ebrillade is a chastisement, and not aid, the use of it is banished the academies.

**EBRO**, antiently **IBERUS**, a large river of Spain, which, taking its rise in old Castile, runs through Biscay and Arragon, passes by Saragosa, and continuing its course through Catalonia, discharges itself with great rapidity into the Mediterranean, about twenty miles below the city of Tortosa.

**EBULLITION**, the same with boiling. See the article **BOILING**.

**EBULLITION** is also used in a synonymous sense with effervescence. See the article **EFFERVESCENCE**.

**EUBULUS**, in botany, the same with the *sambucus*. See the article **SAMBUCUS**.

**EBUR**, **IVORY**. See the article **IVORY**.

**ECATOMBÆON**, or **HÆCATOMBÆON**. See the article **HÆCATOMBÆON**.

**ECAVESSADE**, in horsemanship, denotes a jerk of the cavesson. See **CAVESSON**.

**ECBOLIUM**, in botany, the same with *adhatoda*. See the article **ADHATODA**.

**ECCANTHIS**, the same with *encanthis*. See the article **ENCANTHIS**.

**ECCENTRIC** and **ECCENTRICITY**. See **EXCENTRIC** and **EXCENTRICITY**.

**ECCHO**, or **ECHO**. See the article **ECHO**.

**ECCHYMOsis**, *εκχυμωσις*, in surgery, an extravasation of the blood from a vein in the arm betwixt the flesh and skin.

There are various degrees of an ecchymosis, so that the arm is hereby not only much swelled, and of a black and blue colour, but is even sometimes violently inflamed with a most acute pain, and followed either with a suppuration or incipient mortification in the limb. This accident frequently proceeds from the vein's being cut quite asunder by the phlebotomist, but oftener from the patient's using his arm too early after bleeding in violent and long exercises, in which the contractions of the muscles make the veins swell, and force their blood through the orifice into the interstices betwixt the flesh and skin, either in a greater or less quantity, in proportion to the degree of violence and exercise.

In a slight ecchymosis, there is little to be feared, as the stagnant blood may be generally dispersed without any great difficulty by the application of a compress dipt in vinegar and salt, or in spirit of wine. Sometimes the blood suppurates, which may be promoted by a diachylon-plaster; and when the matter is once brought to maturity, it generally makes its own way through the integuments, without any incision; after which, being discharged, the wound may be healed by a bit of diachylon-plaster. If the stagnating blood be very large, there are no hopes left to disperse it: then the disorder is in danger of terminating either in a large abscess or a gangrene: but to prevent these consequences, the surgeon should scarify, and make little incisions upon the hard part to discharge the blood, and then apply diachylon-plaster; and if the vein is already possessed with a violent inflammation or gangrene, it should be well scarified and invested with discutient cataplasms. At the same time it is necessary to bleed in some other part, and to administer attenuating medicines internally till it abates, or the gangrene spreads no farther.

**ECCLESIA**, in law, signifies a church or parsonage. See the articles **CHURCH** and **PARSONAGE**.

**ECCLESIASTES**, a canonical book of the Old Testament, the design of which is to shew the vanity of all sublunary things.

It was composed by Solomon, who enumerates the several objects on which men place their happiness, and then shews the insufficiency of all worldly enjoyments.

The Talmudists make king Hezekiah to be the author of it; Grotius ascribes it

to Zorobabel, and others to Isaiah; but the generality of commentators believe this book to be the produce of Solomon's repentance, after having experienced all the follies and pleasures of life.

**ECCLESIASTICAL**, an appellation given to whatever belongs to the church: thus we say, ecclesiastical polity, jurisdiction, history, &c. See the articles **POLITY**, **JURISDICTION**, **HISTORY**, &c. Ecclesiastical jurisdiction may be exercised by doctors of the civil law, though they are laymen.

**ECCLESIASTICAL COURT**. See **COURT**. **ECCLESIASTICUS**, an apocryphal book, generally bound up with the scriptures, so called from its being read in the church, *ecclesia*, as a book of piety and instruction, but not of infallible authority.

The author of this book was a Jew, called Jesus the son of Sirach. The Greeks call it the wisdom of the son of Sirach.

**ECCOPE**, in surgery, the same with amputation. See **AMPUTATION**.

**ECCOPROTICS**, in pharmacy, the same with gentle cathartics and evacuants. See **CATHARTICS** and **EVACUANTS**.

**ECHAPE**, in the manege, a horse begot between a stallion and a mare of different breeds and countries.

**ECHAPER**, in the manege, a gallicism used in the academies, implying to give a horse head, or to put on at full speed.

**ECHARPE**, in the military art. See the article **BATTERY**.

**ECHAUGETTE**, in the military art, denotes a guerite of wood, and of a square form. See the article **GUERITE**.

**ECHENEIS**, in ichthyology, a genus of malacopterygious fishes, whereof the branchiostegæ membrane on each side contains about nine ossicles or small bones: its head is flat on the upper part, and marked with a number of rough transverse striæ, or ridges.

Of this genus, there is only one known species, the remora of authors. See the article **REMORA**.

**ECHEVIN**, *scabimus*, in the french and dutch polity, a magistrate elected by the inhabitants of a city or town, to take care of their common concerns, and the decoration and cleanliness of the city.

At Paris, there is a prévôt, and four echevins; in other towns, a mayor and echevins. At Amsterdam, there are nine echevins; and, at Rotterdam, seven.

In France, the echevins take cognizance of rents, taxes, and the navigation of rivers, &c. In Holland, they judge of civil

evil and criminal causes; and if the criminal confesses himself guilty, they can see their sentence executed without appeal.

**ECHEVIN** of the palace, an officer of the household under the first race of the french kings.

**ECHINATE**, or **ECHINATED**, an appellation given to whatever is prickly, thereby resembling the hedge-hog.

**ECHINATUS**, in ichthyology, a species of ostracion. See **OSTRACION**.

**ECHINITES**, in natural history, the name by which authors call the fossile centronia, frequently found in our chalk-pits. See the article **CENTRONIA**.

**ECHINOMETRA**, the same with echinodermata, or centronia.

**ECHINOPHORA**, in botany, a genus of the *pentandria-digynia* class of plants, the corolla of which consist of five unequal, patulous petals: it has no pericarpium; the general involucre is of a turbinated figure; and the seeds are two in number, and of an oblong form.

**ECHINOPHORA** is also used by Rivinus for the caulalis. See the article **CAUCALIS**.

**ECHINOPS**, or **ECHINOPUS**, **GLOVE-THISTLE**, in botany, a genus of the *syngenesia-polygamia-aqualis* class of plants, the flower of which is compound; consisting of a great number of floscules or small flowers, divided into several acute segments: there is no pericarpium: the seed, which is single, is of an ovato-oblong figure, narrower at the base, with an obtuse hairy apex. See plate **LXXXII.** fig. 2.

The roots and seeds of this plant are said to be attenuant and diuretic.

**ECHINUS**, in zoology, a name frequently used for the erinaceus, or common hedge-hog. See the article **ERINACEUS**.

**ECHINUS MARINUS**, the same with centronia. See the article **CENTRONIA**.

**ECHINUS**, in architecture, a member or ornament near the bottom of the ionic, corinthian, and composite capitals.

**ECHIUM**, **VIPER'S BUGLOSS**, in botany, a genus of the *pentandria-monogynia* class of plants; the flower of which consists of a single petal, the tube being very short, and the limb erect, growing gradually wider at the extremity, where it is divided into five unequal segments; the two upper segments are longer than the rest, and the lowest one is small, acute, and reflex; there is no pericarpium, instead of which the cup becomes rigid, and contains in it four roundish and obliquely

acuminated seeds. See plate **LXXXII.** fig. 3.

A powder of the root of this plant is recommended against epilepsies: It is also a sudorific, vulnerary, and prescribed against the erysipilas.

**ECHO**, a sound reverberated or reflected to the ear from some solid body. Whereas the undulatory motion of the air, which constitutes sound is propagated in all directions from the sounding body, it will frequently happen that the air, in performing its vibrations, will impinge against various objects, which will reflect it back, and so cause new vibrations the contrary way: now if the objects are so situated as to reflect a sufficient number of vibrations back, *viz.* such as proceed different ways, to the same place, the second will be there repeated, and is called an echo: and the greater the distance of the objects is, the longer will be the time before the repetition is heard: and when the sound, in its progress, meets with objects at different distances, sufficient to produce an echo, the same sound will be repeated several times successively, according to the different distances of these objects from the sounding body, which makes what is called a repeated echo. See **SOUND** and **REFLECTION**.

In order to account for the nature of echoes, we must consider that sound is perceived as coming from that place from which, as a center, the pulses are propagated. This is well known by experience; but to illustrate the matter, let **A** (plate **LXXXII.** fig. 4.) be the center from whence any sound is directly propagated, and strikes against any plane obstacle **BC**, sufficiently large; draw **AF** perpendicular to **BC**, and produce it to **H**, so that it may be  $AF = FH$ ; the sound reflected will be perceived as coming from the point **H**. For let **AE** be the incident ray, impinging against the obstacle **BC**, in the point **E**; from **E** draw the ray **ED** in such a manner that the angle **CED** may be equal to the angle **FEA**, or that the angle of incidence may be equal to the angle of reflection; then will **ED** be the reflected ray of sound, and if produced will pass thro' the point **H**; for the angle  $FEH = CED = FEA$ . Therefore in the triangle **AFE** and **EFH**, since the angles of the one are respectively equal to the angles of the other, and the side **EF** is common to both, the sides of one triangle will be respectively equal to the sides of the

the other; and therefore  $HF = AF$ . Wherefore the reflex sound will be heard by a person at D, as coming from the point H. As the place of the auditor, or point D, approaches towards A, the case will constantly be the same with respect to the center of sound H; the triangles will still be equal, and all their angles and sides respectively; and therefore when D coincides with H, the reflex sound or echo will be heard from the point H, which was to be demonstrated.

The same sound is also heard twice by an auditor at D; first by the direct ray A D, and secondly by the reflex ray A E D, provided the difference between A D and A E D be sufficiently great, that the direct and reflex sounds do not, in the same sensible moment of time, affect the ear: for if the reflex sound arrives at the ear before the impression of the direct sound ceases, the sound will not be double, only rendered more intense.

From the velocity of sound it follows, that a person speaking or uttering a sentence in A aloud, in order to observe the echo by reflection from the obstacle B C, ought to stand at least 73 or 74 feet from it, that is,  $AF = 74$ : and since at the common rate of speaking, we pronounce not above  $3\frac{1}{2}$  syllables per second; therefore, that the echo may return just as soon as the three syllables are expressed, we must have twice A F equal to 1000 feet, or the speaker must stand about 500 feet from the obstacle B C, and so in proportion for any other number of syllables.

ECHO, in architecture, a term applied to certain kinds of vaults and arches, most commonly of elliptical and parabolical figures, used to redouble sounds, and produce artificial echoes.

We learn from Vitruvius, that in several parts of Greece and Italy, there were brazen vessels artfully ranged under the seats of the theatres, to render the sound of the actors voices more clear, and make a kind of echo. A single arch or concavity can scarce ever stop and reflect the sound; but if there be a convenient disposition between it, part of the sound that is propagated thither, being collected and reflected as before, will present another echo; or if there be another concavity opposed at a due distance to the former, the sound reflected from the one upon the other will be tossed back again upon this latter, &c.

ECHO, in poetry, a kind of composition

wherein the last words or syllables of each verse contain some meaning, which being repeated apart, answers to some question or other matter contained in the verse, as in this beautiful one from Virgil:

*Crudelis mater magis, an puer improbus ille?*

*Improbus ille puer, crudelis tu quoque mater.*

The elegance of an echo consists in giving a new sense to the last words; which reverberate, as it were, the motions of the mind, and by that means affect it with surprise and admiration.

ECHOMETER, among musicians, a kind of scale or rule, with several lines thereon, serving to measure the duration and length of sounds, and to find their intervals and ratios.

ECHUS, or ECCHUS, a term sometimes used in a synonymous sense with piano. See the article PIANO.

ECLECTICS, *eclectici*, ancient philosophers, who, without attaching themselves to any particular sect, selected whatever appeared to them the best and most rational, from each.

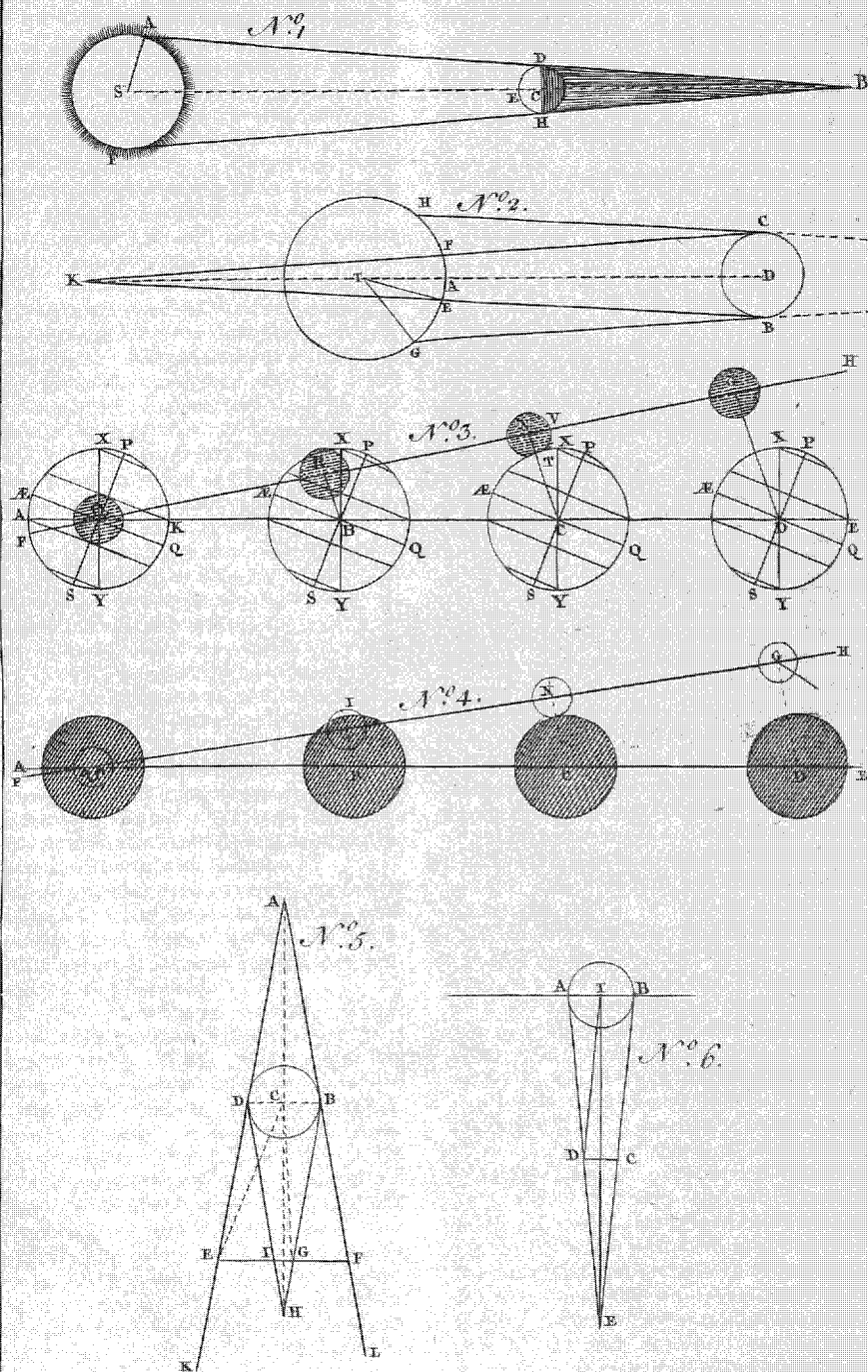
Potamon of Alexandria was the first of the eclectics: he lived in the reigns of Augustus and Tiberius; and being tired with the scepticism of the pyrrhonians, he resolved upon a scheme that would allow him to believe something, but without being so implicit as to swallow any entire hypothesis.

ECLECTOS, the same with what is more usually called *linctus*. See the article LINCTUS.

ECLIPSE, in astronomy, the deprivation of the light of the sun, or of some heavenly body, by the interposition of another heavenly body between our sight and it. Thus, eclipses of the sun happen by the moon's intervening between it and the earth; by which means the shadow of the moon falls upon the earth, when the latitude of the moon does not prevent it, by elevating the moon above, or depressing it below the earth. On the other hand, an eclipse of the moon can only happen when the earth is interposed between the sun and it; for then, if the latitude of the moon does not prevent, the shadow of the earth may fall on the moon, and thereby cause either a partial or total eclipse. A total eclipse of the sun or moon is when their whole bodies are obscured; and a partial one is when part only



# ECLIPSE



only of their bodies is darkened : again, a central eclipse is when it is not only total, but the eclipsed body passes through the center of the shadow.

*Astronomy of ECLIPSES.* The sun being a luminous body, vastly larger than the earth, will enlighten somewhat more than one half of it, and cause it to project a long conical shadow, as represented in plate LXXXIII. n° 1. where S is the sun, E the earth, and HBD its conical shadow.

The height or length of this shadow, at the mean distance of the sun, may be found by this proportion : as the tangent of the angle CBD, or the semi-diameter under which the sun appears at the earth, viz.  $AS = 16' : \text{radius} :: 1 : \text{the length of the shadow } CB = 214.8 \text{ semi-diameters of the earth}$  : but when the sun is at its greatest distance, the length of the shadow CB will be equal 217 of these semi-diameters. Hence it appears, that though the height of the shadow is near three times as great as the mean distance of the moon, yet it falls far short of the distance of mars, and consequently can eclipse none of the heavenly bodies but the moon.

To find the height of the moon's shadow, supposed to be similar to that of the earth, and consequently proportional to the diameters of the bases, the proportion is, as the diameter of the earth 100 to the diameter of the moon 28, so is the mean altitude of the earth's shadow 214.8 to the altitude of that of the moon  $60 \frac{144}{1000}$  of the earth's semi-diameters. The shadow of the moon therefore will just reach the earth in her mean distance, which it cannot do in her apogee ; but in her perigee it will involve a small part of the earth's surface.

Besides the dark shadow of the moon, there is another, called the penumbra ; to represent which, let S (plate LXXXIV. n° 2.) be the sun, T the earth, D the moon, KCF and ABE the two lines touching the opposite limbs of the sun and moon ; then it is evident that CFEB will be the dark or absolute shadow of the moon, in which a person on the earth's surface, between F and E, is wholly deprived of the sun's light. Again, let KBG and ACH be two other lines touching the sides of the sun and moon alternately, and intersecting each other at the point I above the moon ; then will HCBG, a frustum of the cone GIH, be the penumbra above-mentioned, in

which a spectator on the earth's surface, between F and H, and E and G, will see part of the sun, whilst the rest is eclipsed.

To calculate the angle of the cone HIG, draw SB ; then in the oblique triangle BIS, the external angle BID is equal to both the internal and opposite angles IBS and ISB ; but ISB, the angle under which the semi-diameter appears at the sun, being insensibly small, the angle BID will be equal to IBS, or KBS, equal to the apparent semi-diameter of the sun. Therefore the part of the penumbral cone CIB is equal and similar to the dark shadow of the moon.

Next, to find how much of the earth's surface can be at any time involved in the moon's dark shadow, or the quantity of the arch EF (plate LXXXIII. n° 2.) let us suppose the sun to be in apogee, and the moon in perigee ; and, in this case, the height of the moon's shadow will be about 61 semi-diameters, and the distance of the moon about 56 ; that is,  $DK = 61$ ,  $DT = 56$ , and  $TE = 1$ . In this case also, the half angle of the shadow  $TKE = 15' 50''$ , as being least of all. Then the proportion is : as 1, or the side TE to the side TK  $= 5$  ; so is the sine of the semi-angle TKE  $= 15' 50''$  to the sine of the angle TEK  $= 1^\circ 19' 10''$ . Wherefore  $TEK + TKE = ATE = AE = 1^\circ 35'$  ; the double of which FE is  $3^\circ 10' = 190'$ , or 220 miles, the diameter of the dark shadow on the surface of the earth when greatest.

After a like manner you may find the diameter of the penumbral shadow at the earth, GEFH (plate LXXXIV. n° 2.) when greatest of all, that is, when the earth is in perihelio, and the moon in apogee ; for then will the sun's apparent diameter be equal to  $16' 23'' = TIG$ , the greatest semi-angle of the cone ; and thence we shall find  $ID = 58 \frac{1}{2}$  semi-diameters of the earth. In this case also, the distance of the moon from the earth is  $DT = 64$  semi-diameters. Therefore as  $TG = 1$  to  $TI = 122 \frac{1}{2}$ , so is the sine of the angle TIG  $= 16' 23''$  to the sine of the angle IGN  $= 35^\circ 42'$ . But  $IGN = TIG + ITG$ , and therefore  $ITG = IGN - TIG = 35^\circ 25'$  ; the double of which  $70^\circ 50' = GEFH = 4900$  english miles nearly, for the diameter of the penumbral shadow when greatest.

From the principles of optics it is evident, that if the plane of the moon's orbit coincided

incided with that of the earth's orbit, there would necessarily be an eclipse of the sun every new moon: thus, if S (plate LXXXIV. n° 1.) represent the sun, B the moon, and T the earth, since the apparent magnitude or disc of the sun is nearly the same with that of the moon, it must necessarily be hid or eclipsed as often as the new moon came between the earth and the sun. But if, as is really the case, the moon's orbit be not in the plane of the ecliptic, but inclined thereto under a certain angle, there may be a new moon, and yet no eclipse of the sun. To illustrate this, let ABCDE be a circle in the plane of the ecliptic, described at the distance of the moon's orbit FGH, intersecting the same in the points B and D, and making an angle therewith ABF, whose measure is the arch GC, as being  $90^\circ$  distant from the angular points or nodes B and D. Now it is evident if the arch GC be somewhat greater than the sum of the apparent semi-diameters of the sun and moon, then at G, and some distance from G towards B, there may be a new moon, and yet no eclipse of the sun; because, in this case, the disc of the moon G is too much elevated or depressed above or below the apparent disc or face of the sun C, to touch it, much less to hide or eclipse any part thereof. But at a certain point M (*ibid.*) in the moon's orbit, the moon will have a latitude only equal to the sum of the semi-diameters of the sun and moon; and, therefore, when the moon is new in that point, she will appear to a spectator in the point Z, to touch the sun only; from whence this point M is called the ecliptic limit, inasmuch as it is impossible there should happen a new moon in any part between it and the node B on each side, without eclipsing the sun less or more: thus, in the figure, may be seen a partial eclipse at K, and a total one in the node itself B.

What has hitherto been said regards, the phenomenon of an eclipse of the sun, as they appear to a spectator on the earth's surface, in whose zenith the moon then is, and where there is no refraction to alter the true latitude of the moon: but when the moon has any latitude, there the process of calculating the appearances of a solar eclipse will be somewhat more complex, on account of the variation of the moon's latitude and longitude for every different altitude, and consequently every

moment of the eclipse. See REFRACTION and PARALLAX.

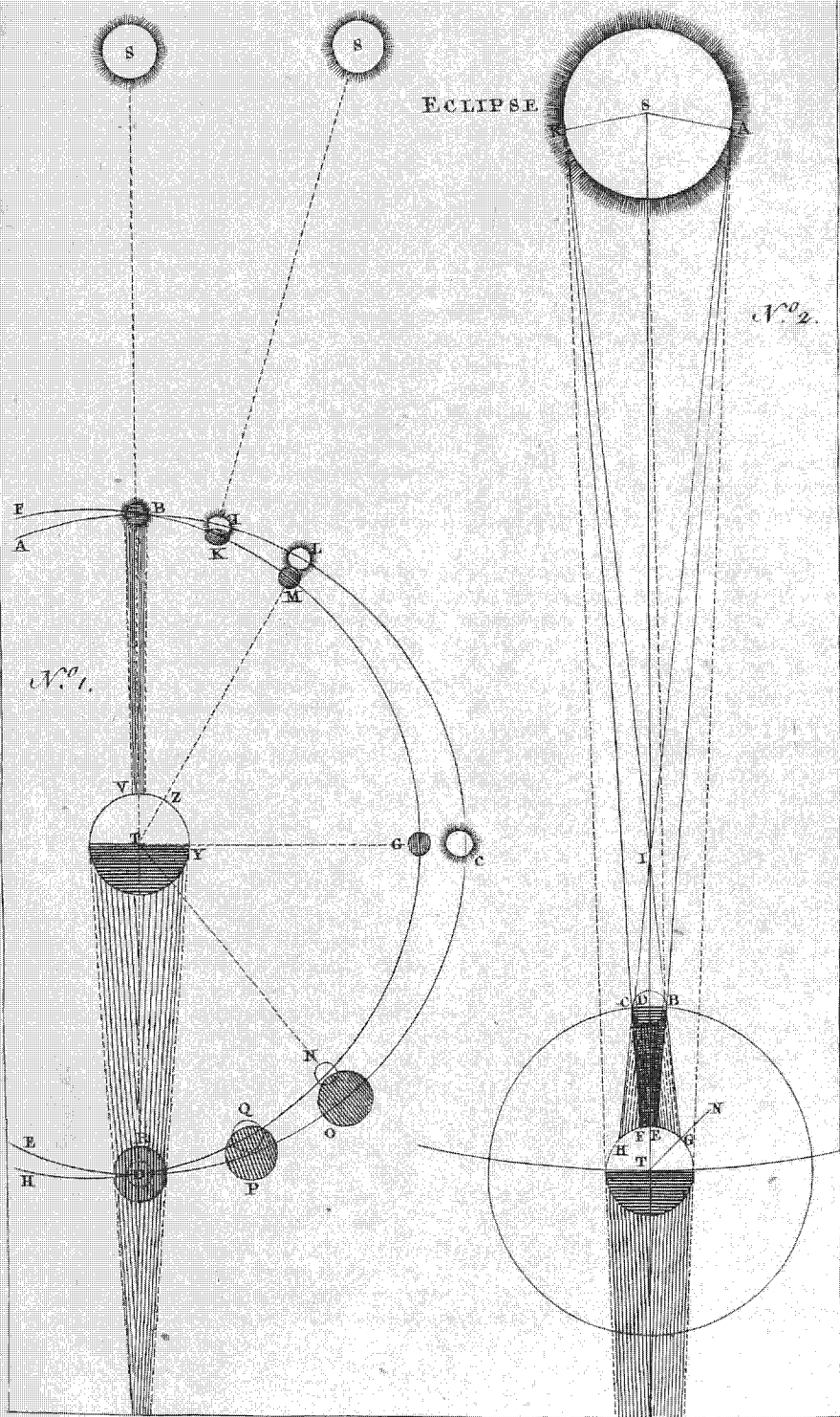
The best way of representing a solar eclipse is by a projection of the earth's disc, and of the section of the dark and penumbral shadow, as they appear, or would appear, to a spectator at the distance of the moon in a right line joining the centers of the sun and the earth. In order to this, we are to find the dimensions of the apparent semi-diameters of the earth, dark shadow, and penumbra at the distance of the moon. As to the first, *viz.* the earth's semi-diameter, it is equal to the moon's horizontal parallax. That of the dark shadow is thus estimated: let C (plate LXXXIII. n° 5.) be the center of the moon, DB its diameter, DHB its dark shadow, and KAL the penumbral cone. Then let EF be the diameter of the penumbra at the earth, and IG that of the dark shadow, and draw CG and CE; then is the angle  $CGB = BHC + GCH$ , and so  $GCH = BGC - BHC$ ; that is, the apparent semi-diameter of the dark shadow, is equal to the difference between the apparent semi-diameters of the sun and moon. In like manner the angle  $ECH = DEC + DAC$ ; that is, the apparent semi-diameter of the penumbra, at the earth, is equal to the sum of the apparent semi-diameters of the moon and sun. Now the semi-diameters of the sun and moon, and also the moon's horizontal parallax, are all ready calculated for their various distances from the earth, and for the least, mean, and greatest eccentricity of the lunar orbit, in the astronomical tables. Therefore, let AE (plate LXXXIII. n° 3.) represent a small portion of the annual orbit, and FH the visible path of the center of the lunar shadows, which will exactly correspond to the position of the moon's orbit with respect to the ecliptic in the heavens; so that the point of intersection Q will be the node, and the angle HQE the angle of inclination of the lunar orbit to the plane of the ecliptic, which is about  $5^\circ$ . Hence, if AEPQS represent the disc of the earth, according to the orthographic projection, in the several places Q, B, C, D, whose semi-diameter is made equal to the number of minutes in the moon's horizontal parallax at the time of the eclipse; and if, in the path of the shadows in the points Q, R, N, G, we describe a small circle whose semi-diameter is equal to the difference of the semi-diameters



ECLIPSE

N<sup>o</sup> 2.

N<sup>o</sup> 1.



J. Jefferys sculp



semi-diameters of the sun and moon, that will be the circular section of the moon's dark shadow at the distance of the earth: again, if a circle is described on the same center, with a semi-diameter equal to the sum of the semi-diameters of the sun and moon, it will represent the penumbral shadow, expressed by the dotted area. Here then it is evident, that if the moon, when new, be at the distance  $\oslash G$  (*ibid.*) from the node, the penumbral shadow will not fall near the earth's disc, and so there cannot possibly happen an eclipse. Again, if the moon's distance from the node be equal to  $\oslash N$ , the penumbral shadow will just touch the disc, and consequently  $\oslash C$  is the ecliptic limit, which may be found by the following analogy, *viz.* as the sine of the angle  $N \oslash C = 5^\circ 30'$  (the angle of inclination of the lunar orbit to the plane of the ecliptic) is to the radius  $= 90^\circ$ , so is the logarithm of the side  $NC = TC + NT = 62' 10'' + 16' 52'' + 16' 23'' = 95' 25''$  to the logarithm of the side  $\oslash C$  equal to the ecliptic limit, which is found to be  $16^\circ 36'$ , beyond which distance from the node  $\oslash$  there can be no eclipse; and within that distance, if the moon be new, the shadow will fall on some part of the earth's disc, as at  $B$ ; where all those places over which the shadows pass, will see the sun eclipsed, in part only by the dotted penumbral shadow; but the sun will be centrally eclipsed in all places over which the center of the shadows pass, and if the moon be new in the node, then will the center of the shadows pass over the center of the disc, as represented at  $\oslash$ . In this case, if the apparent diameter of the moon be greater than that of the sun, the face of the sun will be wholly eclipsed to all places over which the center of the shadow passes; but if not, the sun will only be centrally eclipsed, his circumference appearing in the form of a bright annulus, or luminous ring; the width whereof will be equal to the difference of the diameters of the luminaries. The disc of the earth, here projected, represents the case of an eclipse on an equinoctial day;  $AK$  being the ecliptic,  $AQ$  the equator,  $XY$  the axis of the ecliptic,  $PS$  the axis of the equator,  $P$  and  $S$  the north and south poles, &c. By this projection the passage of shadows over the earth's disc may be exhibited for any place of the sun, or declination of the moon.

As to the calculation of eclipses of the sun, it is at best but a troublesome business, which depends upon the following data: 1. The mean conjunction, and from thence the true conjunction, together with the place of the luminaries at the apparent time of true conjunction. 2. The apparent time of the visible new moon, at the apparent time of the true conjunction. 3. The apparent latitude at the apparent time of the visible conjunction. From these data, the other quæstia may be obtained; so that the greatest part of the trouble arises from the parallaxes of longitude and latitude, without which the calculation of solar eclipses would be the same with that of lunar ones.

*Astronomy of lunar ECLIPSES.* These being occasioned by the immersion of the moon into the earth's shadow, all that we have to do, in order to delineate a lunar eclipse, is to calculate the apparent semidiameter of the earth's shadow at the moon. Thus, let  $AB$  (plate LXXXIII. n<sup>o</sup> 6.) represent the earth,  $T$  its center,  $AEB$  its conical shadow,  $DC$  the diameter of a section thereof at the moon; and drawing  $DT$ , we have the outward angle  $ADT = DTE + DET$ ; so that  $DTE = ADT - DET$ ; that is, the angle  $DTE$ , under which the semi-diameter of the earth's shadow appears at the distance of the moon, is equal to the difference between the moon's horizontal parallax  $ADT$ , and the semi-diameter of the sun  $DET$ . If, therefore,  $AE$ , (*ibid.* n<sup>o</sup> 4.) represent the path of the earth's shadow at the distance of the moon near the node  $\varphi$ , and  $FH$  a part of the lunar orbit, and the section of the earth's shadow be delineated at  $\oslash, B, C, D$ ; and the full moon at  $\oslash, I, N, G$ ; then it is evident there can be no eclipse of the moon, where the least distance of the centers of the moon and shadow exceeds the sum of their semi-diameters, as at  $D$ . But where this distance is less, the moon must be eclipsed either in part or wholly, as at  $B$  and  $\oslash$ ; in which latter case the moon passes over the diameter of the shadow. But in a certain position of the shadow, as at  $C$ , the least distance of the centers,  $NC$ , is equal to the sum of the semi-diameters; and consequently  $\oslash C$  is the ecliptic limit for lunar eclipses: to find which, we have this analogy, as the sine of the angle  $N \oslash C = 5^\circ$  (the in-

clination of the moon's orbit to the plane of the ecliptic) is to the radius, so is the logarithm of the side  $NC=63^{\circ}12'$  to the logarithm of the side  $EC=12^{\circ}5'$  the ecliptic limit. Hence, if the moon be at a less distance from the node  $C$  than  $12^{\circ}5'$ , there will be an eclipse; otherwise none can happen.

If the earth had no atmosphere, the shadow would be absolutely dark, and the moon involved in it quite invisible; but, by means of the atmosphere, many of the solar rays are refracted into, and mixed with the shadow, whereby the moon is rendered visible in the midst of it, and of a dusky red colour.

For calculating eclipses of the moon, the following data are necessary: 1. Her true distance from the node, at the mean conjunction. 2. The true time of the opposition, together with the true place of the sun and moon, reduced to the ecliptic. 3. The moon's true latitude, at the time of the true conjunction, and the distance of the luminaries from the earth: also their horizontal parallaxes, and apparent semi-diameters. 4. The true horary motions of the moon and sun, and the apparent semi-diameter of the earth's shadow. With these data it is easy to find the duration, beginning, middle, and quantity of eclipses.

**ECLIPSES of the satellites.** See **SATELLITES**.

**ECLIPTIC**, in astronomy, a great circle of the sphere, supposed to be drawn thro' the middle of the zodiac, making an angle with the equinoctial of about  $23^{\circ}30'$ , which is the sun's greatest declination; or, more strictly speaking, it is that path or way among the fixed stars, that the earth appears to describe, to an eye placed in the sun.

Some call it *via solis*, the way of the sun, because the sun, in his apparent annual motion, never deviates from it, as all the other planets do, more or less. See the articles **GLOBE** and **ZODIAC**.

It is called ecliptic, by reason all eclipses happen when the planets are in or near its nodes. See the article **NODE**.

The axis of the ecliptic is a right line supposed to pass through the center of the sun, and to be perpendicular to the plane of the ecliptic; and the points in the heavens, to which this axis points, are called the poles thereof; and the great circles, passing through these poles, will be perpendicular to its plane, and therefore are called its secondaries, and sometimes circles of longitude.

As to the obliquity of the ecliptic, or angle which its plane makes with that of the equinoctial, it is found to vary; the mean obliquity being found by Dr. Bradley to be  $23^{\circ}28'30''$ , who supposes this variation may be owing to a nutation of the earth's axis, or to a gradual approach of the ecliptic to the equinoctial, at about the rate of  $1'$  in 100 years.

**ECLIPTIC**, in geography, a great circle on the terrestrial globe, not only answering to, but falling within the plane of the celestial ecliptic. See **GLOBE**.

**ECLOGUE**, *εκλογία*, in poetry, a kind of pastoral composition, or a small elegant poem, in a natural simple style. See the article **PASTORAL**.

The eclogue, in its primary intention, is the same thing with the idyllium, but custom has made some difference between them, and appropriated the name eclogue to pieces wherein shepherds are introduced, and idyllium to those written like eclogues, but without any shepherds in them. The eclogue then is properly an image of pastoral life, upon which account the matter is low, and its genius humble. Its business is to describe the loves, sports, piques, jealousies, intrigues, and other adventures of shepherds; so that its character must be simple, the wit easy, and the expression familiar. Then the true character of the eclogue is simplicity and modesty; its figures are neat, the passions tender, the motions easy, and though sometimes it may have little transports, and despairs, yet it never rises so high as to be fierce or violent. Its narrations are short, descriptions little, the thoughts ingenious, the manners innocent, the language pure, the verse flowing, the expressions plain, and all the discourse natural.

The models in this sort of poetry are Theocritus and Virgil, who both have some eclogues of a lofty character. The eclogue therefore occasionally raises its voice: yet M. Fontenelle blames some modern poets for having made matters of high concern the subject of some of their eclogues, and caused their shepherds sing the praises of kings and heroes. The Italians are thought faulty in this respect, for aiming generally to be too witty or superbe in their style: however, since the establishment of the Academy of Arcadians at Rome, the taste for eclogues has been greatly improved amongst them. Some imagine the name eclogue to have been originally applied to such poems as were wrote in imitation of others: such

are

are the Eclogues of Virgil, which are only imitations of Theocritus.

**ECLOGUE** is also applied to certain compositions in prose: such are those of Strabo, Diodorus, &c. in which sense, the word signifies only an extract, or collection.

**ECOUTE'**, in the manege, a pace or motion of a horse, when he rides well upon the hands and the heels, is compactly put upon his haunches, and bears or listens to the heels or spurs, and continues duly balanced between the heels, without throwing to either side. This happens when a horse has a fine sense of the aids of the hand and heel.

**ECPHONESIS**, the same with exclamation. See the article **EXCLAMATION**.

**ECPHORA**, in architecture, commonly signifies the distance between the extremity of a member or moulding, and the naked of the column, or any other part it projects from.

Some authors, however, account for the ecphora from the axis of the column, and define it to be the right line intercepted between the axis and the outermost surface of a member or moulding.

**ECPHRACTICS**, in medicine, remedies which attenuate and remove obstructions. See the articles **ATTENUANTS** and **DEOBSTRUENTS**.

**ECPIESMA**, in surgery, a sort of fracture of the cranium, when the bones are much shattered, and, pressing inwardly, affect the membranes of the brain.

**ECPIESMA**, in pharmacy, signifies the mass remaining after the juices of vegetables have been pressed out: and, in this sense, is the same as magma. It sometimes further imports the juice pressed out.

**ECPIESMUS**, *εκπιεσμος*, in the ancient writers of medicine, a word used to express a distemperature of the eye, consisting in a very great prominence of the entire globe of the eye, which is, as it were, thrust out of its socket or orbit, by a great flux of humours, or an inflammation.

**ECPUCTICA**, in pharmacy, the same with incrassants. See **INCRASSANTS**.

**ECSTATICI**, *εκστατικοι*, in grecian antiquity, a sort of diviners, who were cast into trances or ecstasies, in which they lay like dead men, or persons asleep, deprived of all sense or motion, but after some time (it may be days, or months, or years, for Epimenides the Cretan is reported to have lain in this posture seventy-five years) returning to themselves,

gave strange relations of what they had seen and heard.

**ECTASIS**, in grammar, the same with diastole. See the article **DIASTOLE**.

**ECTHESIS**, in church-history, a confession of faith, in the form of an edict, published in the year 639, by the emperor Heraclius, with a view to pacify the troubles occasioned by the eutychian heresy in the eastern church. However, the same prince revoked it, on being informed that pope Severinus had condemned it, as favouring the monothelites; declaring at the same time, that Sergius, patriarch of Constantinople, was the author of it.

**ECTHLIPSIS**, *εκθλιψις*, among latin grammarians, a figure of prosody whereby the *m* at the end of a word, when the following word begins with a vowel, is elided, or cut off, together with the vowel preceding it, for the sake of the measure of the verse: thus they read *mult' ille*, for *multum ille*.

The reason of an ecthlipsis, which in latin verse ought always to take place when the immediately following word begins with a vowel, is to prevent the harshness of an hiatus, or concourse of vowels.

**ECTROPIUM**, in surgery, is when the eye-lids are inverted, or retracted so as to shew their internal or red surface, and cannot sufficiently cover the eye. Sometimes this is a simple or original disorder, and sometimes only a symptom, or consequence of another, as an inflammation, sarcoma, tumour, &c. When the disorder is simple, or original, it generally arises from a contraction of the skin of the eye-lid, by the scar of a wound, ulcer, burn, &c. or from an induration and contraction of the skin after an inflammation; and sometimes it may proceed, in a great measure, from the use of astringent collyria injudiciously applied, in disorders of the eyes.

The cure of this disorder consists in elongating, or relaxing, the external skin of the eye-lid so as to cover the eye. When the disorder is recent, it will be best to try the application of emollients, such as the vapours of hot milk or water, oil of almonds, or olives, mucilage of quince-seeds, hare's foot, ung. dialthææ, &c. to be continued for several days on the scar, or contracted skin of the eye-lid, which must be often extended, either upwards or downwards, according as the disorder is in the upper or lower lid. And every night, when the patient goes

to bed, it will be proper to bring the eye-lids close to each other, and to restrain them close by plaster, comprefs, and bandage, to be renewed every night. If none of these means take effect, it will be proper first to make a semilunar incision in the external skin of the eye-lid, next its tarsus; making the angles of the incision downwards in the upper lid, and upward in the lower lid, that the skin may be elongated. If the skin does not appear to be let out enough by one incision, two or three more must be made, running parallel to the first, and about the distance of a small packthread from each other, and when the eye-lid is thus sufficiently elongated, the incisions must first be stuffed with dry lint, and then with lint armed with vulnerary unguent; and lastly, a piece of sticking plaster should be fastened to the margin of the eye-lid, to keep it extended either up or down; which method should be continued till the eye-lids shut close. When the disorder arises from an inflammation, or fleshy excrescence within the eye-lid, the inflammation must be removed, and arming the eye with a defensive plate, the excrescence must be removed by lapis infernalis. When the skin of the eye-lid has continued violently distorted from the patient's birth, there are seldom any hopes of curing it.

**ECTYLOTICS**, in pharmacy, remedies proper for consuming callosities. See the article **CALLUS**.

**ECTYPE**, *εκτύπον*, among antiquarians, an impression of a medal, seal, or ring, or a figured copy of an inscription, or other ancient monument.

**ECU**, or **ESCU**, a french crown, for the value of which see the article **COIN**.

**ECUSSON**, in heraldry, a little escutcheon. See the article **ESCUTCHEON**.

**EDDISH**, or **EADISH**, the latter pasture, or grafs that comes after mowing, or reaping; otherwise called eagrafs, earls, and etch.

**EDDY-TIDE**, or **EDDY-WATER**, among seamen, is where the water runs back contrary to the tide; or that which hinders the free passage of the stream, and so causes it to return again.

**EDDY-WIND** is that which returns, or is beat back from a sail, mountain, or any thing that may hinder its passage.

**EDESSA**. See the article **ORFA**.

**EDGE**, in general, denotes the side or border of a thing; but is more particularly used for the sharp side of some weapon, instrument, or tool: thus we say,

the edge of a sword, knife, chissel, &c.

In the sea-language, a ship is said to edge in with another, when making up to it, **EDGINGS**, among gardeners, the series of small but durable plants, set round the edges or borders of flower-beds, &c.

The best and most durable plants for this use is box, which, if well planted, and rightly managed, will continue in strength and beauty for many years. The seasons for planting these are the autumn and very early in the spring; and the best species for this purpose is the dwarf dutch box.

The edgings of box are now only planted on the sides of borders next walls, and not, as was some time since the fashion, all round borders, or fruit-beds, in the middle of gardens, unless they have a gravel-walk between them, in which case it serves to keep the earth of the borders from washing down on the walks in hard rains, and fouling the gravel. Daisies, thrift, or sea-july-flowers, and chamomile are also used, by some, for this purpose; but they grow out of form, and require yearly transplanting.

**EDHELING**, *edhelings*, the same with atheling. See **ATHELING**.

**EDICT**, *edictum*, in matters of polity, an order or instrument, signed and sealed by a prince, to serve as a law to his subjects. We find frequent mention of the edicts of the prætor, the ordinances of that officer in the roman law. In the french law, the edicts are of several kinds; some importing a new law or regulation; others, the erection of new offices; establishments of duties, rents, &c. and sometimes articles of pacification. In France edicts are much the same as a proclamation is with us, but with this difference, that the former have the authority of a law in themselves, from the power which issues them forth; whereas the latter are only declarations of a law, to which they refer, and have no power in themselves. Edicts can have no room in Britain, because that the enacting of laws is lodged in the parliament, and not in the king. Edicts are all sealed with green-wax, to shew that they are perpetual and irrevocable.

**EDIFICE**, the same with building. See the article **BUILDING**.

**EDILE**, or **ÆDILE**. See **ÆDILE**.

**EDINBURGH**, the capital city of Scotland, situated about one mile south of Leith and of the firth of Forth, eighty-two miles north-west of Newcastle, and about three hundred north-west of London:

don: west long. 3°, and north lat. 56°. Here the parliament of that antient kingdom used to assemble, before its union with England; and here the supreme courts of justice for North Britain are still held. It has likewise a celebrated university, and exceeds all the cities of the world for the loftiness of its buildings, which are all of hewn stone, faſhied, and ten, eleven, or more stories high: it is also remarkable for the spaciousness of its High-street, its Castle, the palace of Holyrood-house, &c.

**EDITOR**, a person of learning, who has the care of an impression of any work, particularly that of an antient author: thus Erasmus was a great editor; the low-vain doctors, Scaliger, Petavius, F. Sirmund, bishop Walton, Mr. Hearne, Mr. Ruddiman, &c. are likewise famous editors.

**EDMOND'S-BURY**. See **BURY**.

**EDUCATION**, the instructing children, and youth in general, in such branches of knowledge and polite exercises, as are suitable to their genius and station.

Education is a very extensive subject, that has employed the thoughts and pens of the greatest men: Locke, the archbishop of Cambray, Tanaquil Faber, M. Crouſaz, and Rollin may be consulted on this head.

The principal aim of parents should be, to know what sphere of life their children are designed to act in; what education is really suitable for them; what will be the consequence of neglecting that; and what chance a superior education will give them, for their advancement in the world. Their chief study should be to give their children such a degree of knowledge, as will qualify them to fill some certain post or station in life: in short, to fit them for an employment suited to their condition and capacity, such as will make them happy in themselves, and useful to society. The education of a nobleman should contain every thing that is both useful and ornamental. Next to languages, he ought to be instructed in philosophy and history, particularly the history of his own nation. He should also be made acquainted with the customs, laws, and manners of different states, but more especially with the constitution of his own country. To this solid learning should be added the embellishment of polite literature, poetry, painting, and music; and, to complete the education, dancing, fencing, riding, and architecture.

As to the education of gentlemen, the plan above laid down will in general hold good. Every gentleman of fortune should certainly give all his sons the education of gentlemen; but the eldest ought to be graced with every ornament. Parents of this class, besides carefully attending to the genius, temper, and inclinations of their younger sons, should resolve on an employment suited to them; which being settled, they are to pursue their education accordingly. The three learned professions, divinity, law, and physic, require each a species of learning proper to itself. But besides these, the sea, the army, and the exchange, with many other genteel employments, are open for them to engage in: and hence appears not only the necessity of considering their fortune, but attending to their genius, temper and inclinations.

As many among the mercantile class are descended of the best gentlemen's families, and as intermarriages are frequent between them, it is highly proper that their children should be genteelly educated. However, even in this, regard should be had to their own fortune, and the real prospects before them: for nothing can be a greater misfortune than to educate a boy like a fine gentleman, and not be able to support it. A learned education is needless, in the case before us; but reading, writing, arithmetic, geography, and drawing, are extremely proper, or rather absolutely necessary.

With regard to manners, the quality should be cautioned never to sink beneath their rank; and while they learn to be humble, they must carefully avoid being mean. The gentry should approach as near to the quality in good behaviour, and politeness, as possible: and as to the trading part of the people, they should be taught that every thing coarse, vulgar, and mean is highly unbecoming them; is not only abusing the faculties providence has furnished them with, but is debasing their nature.

Before we conclude this article, it will be proper to take notice of the impropriety and inconvenience of not teaching young people to think and act of themselves. The art of a governor, and the lessons of a preceptor, change a child into a youth; they infuse into him a greater share of knowledge than he could be naturally supposed to have at his age. But this very child, when he arrives to that stage of life in which he must think, speak, and

and act of himself, is stripped all of a sudden of his premature merit. His summer is far from answering the fine blossoms of his spring. The too solicitous education he has received, becomes rather prejudicial to him, by reason of its being the occasion of his falling into the dangerous habit of letting other people think for him. His mind has contracted an internal laziness, which makes him wait for external impulses to resolve and to act. The mind contracts a laziness with as much facility as the legs and feet. A man who never stirs without the assistance of some vehicle, becomes soon incapable of the same free use of his legs, as a person that has been constantly accustomed to walk. As, therefore, we must lend a hand to the one when he walks, so we must help the other to think, and even to will : whereas in a child bred up with less care, his inward part labours of itself, and his mind grows active. He learns to reason and determine of himself, in the same manner as other things are learned. At length he attains to argue and resolve rightly, by mere dint of reasoning and reflecting on the cause of his deception, when the events convince him of the error of his judgment.

**EDULCORATION**, in pharmacy, the same with **dulcifying**. See the article **DULCIFYING**.

**EDULCORATION**, in chemistry, the separating, by a washing, or solution, in water, the salt that any body may be impregnated with, or those that may be left adhering to a body, after any operation. See the article **ÆLUTION**.

The solution here spoke of, is in metals only, and is properly a kind of moist one, the saline parts adhering to bodies not soluble in water, being by that menstruum taken up, and eaten off from the body, and the solution afterwards separated from the remaining solid, either by subsidence or filtration. See the article **FILTRATION**.

It is proper in this operation to enlarge the surface of the body to be edulcorated, by pounding it in a mortar, that the solution may have the speedier success; and for this purpose it should always be kept stirring with a stick, while the water is on it, that all the parts of the body to be edulcorated, which otherwise would some of them sink to the bottom, may be made equally, at one time or other, contiguous to the particles of the edulcorating fluid, by which all the solutions are

greatly facilitated. Boiling water is, in some cases, requisite; for the heat of that, by the inward motion and rarefaction it occasions, promotes in an extraordinary manner saline solutions. Very frequent repetitions of this operation are necessary; and, after all, a nice experiment will always find some small portion of salts remaining.

**EEL**, *anguilla*, in ichthyology, a species of *muræna*. See **MURÆNA**.

The common eel is the simple coloured *muræna*, with the lower jaw longest: it has three fins, *viz.* two pectoral ones, standing one on each side; and a single low back-fin, which beginning at some distance from the head, runs along the back to the tail, and comes up again continuous as far as the anus: the extremity of this fin, which forms what may be called the tail, is neither round nor square, but subacute. See plate **LXXXV**. fig. 1.

It is common in all our fresh waters, ponds, ditches, and rivers; and its general standard is about two feet in length, though some are often caught much larger.

The fat of eels is accounted **vulnerable**, and good in an **alopecia**, cases of **deafness**, and the **hæmorrhoids**.

Eel-fishing is of divers kinds, as **snigging**, **bobbing**, &c. See **FISHING**.

The silver-eel may be caught with several sorts of baits, as powdered beef, lobes, or garden-worms, minnows, hens-guts, fish-garbage, &c. The most proper time for taking them is in the night, fastening your line to the bank-sides, with your laying-hook in the water: or a line may be thrown with good store of hooks, baited and plummed, with a float to discover where the line lies, that they may be taken up in the morning.

**Microscopic EELS**, those discovered by the microscope in pepper-water and other infusions of plants, as well as in the seed of most animals. See **ANIMALCULES**.

**Sea-EEL**, *anguilla marina*, a fish otherwise called **conger**; being a species of *muræna*, with the upper edge of the back-fin black. See the articles **CONGER** and **MURÆNA**.

**EEL-BACKED**, an appellation given to such hories as have black lists along their back.

**EEL-POUT**, the english name of a fish of the *gadus*-kind, with three fins on the back, cirri at the mouth, and the two jaws equal: the generality of authors call it *mustela fluviatilis*. See **GADUS**.

**EEL-SPEAR**,



**EEL-SPEAR**, a forked instrument with three or four jagged teeth, used for catching of eels: that with the four teeth is best, which they strike into the mud at the bottom of the river, and if it strike against any eels, it never fails to bring them up.

**EFFARE'**, or **EFFRAYE'**, in heraldry, a term applied to a beast rearing on its hind legs, as if it were frightened or provoked.

**EFFECT**, in a general sense, is that which results from, or is produced by, any cause. See the article **CAUSE**.

**EFFECTS**, in commerce, law, &c. the goods possessed by any person, whether moveable or immoveable. See **CHATTELS**, **GOODS**, &c.

**EFFECTS**, in the manege, the motions of the hand that serve to conduct the horse. See the article **AIDS**.

There are four effects of the hand, or four ways of making use of the bridle, *viz.* to push a horse forwards, to give him head, to hold him in, and to turn the hand either to the right or left.

**EFFECTIONS**, in geometry, are used in the same sense with the geometrical construction of propositions, and often of problems and practices, which, when they are deducible from, or founded upon, some general proposition, are called the geometrical effections thereunto belonging.

**EFFERDING**, a town of upper Austria, about ten miles west of Linz.

**EFFERVESCENCE**, in a general sense, signifies a slight degree of ebullition in liquors exposed to a due degree of heat: but the chemists apply it to that intestine motion excited in various fluids, either by the mixture of fluids with others of a different nature; or by dropping salts, or powders, of various kinds into fluids.

The two most common opposites, acids and alkalis, on being mixed, cause a great ebullition, or frothing, but no great heat: but the solution of some metals in aquafortis, cause intense heat, and emit flame. The mixing aromatic oils with acid mineral spirits, actually kindle and burn with violent explosions; and some vegetable substances, putrifying with moisture, will, sometimes, heat so as to kindle whatever lies dry about that part of the heap where the putrefaction happens.

Hence, effervescences are distinguished into hot and cold; that which pro-

duces heat in the substances so mixt, is called a hot effervescence, but if no heat is excited, it is called a cold effervescence. Among the mixtures that excite a cold effervescence, is that of powdered coral mixt with distilled vinegar; which is accounted for hence, by Chauvin, that the pores of the coral being very great, it may be easily dissolved in the acid spirit, without any great friction, or collision of the parts, such as would be necessary to generate any considerable heat.

The principal bodies in which effervescences happen, according to Boerhaave, are, 1. Native vegetable acids, as most juices of trees, shrubs, and plants that run in the spring; most juices of unripe summer fruits; particular juices, remaining acid when ripe, as of oranges, citrons, lemons, tamarinds, sorrel, wood-sorrel; fermented acid vegetables, as the meals when they turn sour; rhenish and Moselle wine, and tartar vegetables twice fermented; native and distilled vinegars; the acids of animals from tartish or acid vegetable aliment, as in the chyle, four milk, whey, butter-milk. 2. The native acids of fossils; as the acid of sulphur, alum or vitriol; or those acids as they lye concealed in sulphur, or vitriol stones; or as thence extracted by a violent fire; or a stronger acid, as in the spirit of nitre, salt, alum, vitriol, and sulphur. 3. True fixed alkalies, made of any vegetable matter, by burning the more volatile alkalies, whether spontaneous, as in garlic, onions, scurvy-grass, mustard, &c. produced by putrefaction from animal or vegetable subjects, or procured from the same by distillation and burning. 4. Certain bodies improperly called alkalies, only on account of agreeing therewith in fermenting with acids: these are almost all the boles, bones, chalk, clays, coral, crab-eyes, earths, horns, hoofs, nails, pearls, shells, stones and teeth. 5. The seven metals. 6. The semimetals; antimony, bismuth, lapis calaminaris, lapis hæmatites, lime, &c.

Hence we have four general rules, *viz.* 1. The bodies of the first class constantly make an effervescence with those of the second and third, either sooner or latter, more or less; or as they are weak or strong. The effervescence continues till the point of saturation is gained, then ceases, and the acrimony, after a full saturation, is generally softened.

2. The

2. The bodies of the first class make an effervescence with those of the fourth, and at the end of the saturation, vitriols are usually produced. 3. The bodies of the third class act in the same manner with those of the fifth. 4. The bodies of the second, third, fourth, and fifth classes, being mixed together, are scarce found to make any effervescence.

**EFFERVESCENCE**, in vintage, a term appropriated by Portzius and others, to signify that working of wine which is by some improperly called fermentation, thereby confounding two very different things. See the article **FERMENTATION**.

**EFFICACIOUS**, a term used by divines, in speaking of grace; importing such grace, as never fails to produce its effect. See the article **GRACE**.

**EFFICIENT CAUSE**. See **CAUSE**.

**EFFICIENTS**, in arithmetic, the same with factors. See **FACTOR**.

**EFFIGY**, *effigies*, the portrait, figure, or exact representation of a person.

**EFFLORESCENCE**, among physicians, the same with exanthema. See the article **EXANTHEMA**.

**EFFLUENT FEVER**, the same with an inflammatory one. See the article **INFLAMMATORY**.

**EFFLUVIUM**, in physiology, a term much used by philosophers and physicians, to express the minute particles, which exhale from most, if not all, terrestrial bodies in form of insensible vapours. See the articles **VAPOUR** and **EXHALATION**. Sometimes indeed, these effluvia become visible, and are seen ascending in form of smoke; constituting what, in animals and plants, makes the matter of perspiration. See **PERSPIRATION**. Nothing can exceed the subtilty of the odoriferous effluvia of plants, and other bodies. Mr. Boyle tells us, that having exposed to the open air a certain quantity of *asa foetida*, he found its weight diminished only the eighth part of a grain in six days: hence, if we suppose, that during all that time a man could smell the *asa foetida* at the distance of five feet, it will appear that its effluvia cannot exceed the

$\frac{1}{282500000000000}$  part of an inch in magnitude.

The effluvia of mineral substances are called steams; and when collected in mines, or other close places, damps. See the article **DAMPS**.

Malignant effluvia are assigned by phy-

sicians, as the cause of the plague, and other contagious diseases; as the jail-distemper, hospital fever, and the like. See **PLAGUE** and **HOSPITAL FEVER**.

Effluvia issuing from corrupted substances, according to the ingenious Dr. Pringle, chiefly consist of the phlogiston or sulphur-principle, only combined with the saline parts of the body: for this principle, when single, is perhaps imperceptible to our sense of smelling; and, when divested of these salts, is never pestilential: so that the deleterious effluvia of rotten substances seem to consist of a certain combination of the sulphureous with the saline principle, which united, not only become the most irritating stimuli to the nerves, but act upon the humours as a putrid ferment, in promoting their corruption. See the article **MALIGNANT FEVER**.

**EFFUSION**, in a general sense, the pouring out of any thing liquid, and that with some violence.

**EFFUSION**, in astronomy, part of the sign aquarius. See **AQUARIUS**.

**EFT**, in zoology, the english name of the common lizard, *lacertus vulgaris*, called also, in several parts of the kingdom, the newt and swift. See the article **LIZARD**.

**EGER**, the same with *agria*. See **AGRIA**.

**EGERMOND**, a market town of Cumberland, ten miles south of Cockermouth.

**EGG**, *ovum*, in physiology, a body formed in certain females, in which is contained an embryo, or foetus of the same species, under a cortical surface, or shell. The exterior part of an egg is the shell, which is in a hen, for instance, a white, thin, and friable cortex, including all the other parts. The shell becomes more brittle by being exposed to a dry heat. It is lined every where with a very thin, but pretty tough membrane, which, dividing at, or very near, the obtuse end of the egg, forms a small bag, where only air is contained. In new-laid eggs this folliculus appears very little, but becomes larger when the egg is kept. Within this are contained the albumen, or white, and the vitellus, or yolk; each of which have their different virtues. See **ALBUMEN** and **VITELLUS**.

The albumen is a cold, viscuous, white liquor in the egg, differing in consistence, in its different parts. It is observed, that there are two distinct albumens, each of which are inclosed in its proper membrane; of these, one is very thin and liquid,

liquid, and the other more dense and viscous, and of a somewhat whiter colour, but, in old and stale eggs, after some days incubation, inclining to a yellow. As this second albumen covers the yolk on all sides, so it is itself surrounded by the other external liquid. The albumen of a fecundated egg, is as sweet and free from corruption, during all the time of incubation, as it is in new laid eggs; as is also the vitellus. As the eggs of hens consist of two liquors separated one from another, and distinguished by two branches of umbilical veins, one of which goes to the vitellus, and the other to the albumen, so it is very probable that they are of different natures, and consequently appointed for different purposes. Aristotle says, that the vitellus is condensed by cold, but the albumen rather liquified. On the contrary, the albumen is condensed by fire; the vitellus retains its softness, if it be not burnt, and concretes more in boiling than in roasting. When the vitellus grows warm with incubation, it becomes more humid, and like melting wax, or fat; whence it takes up more space, for as the foetus increases, the albumen insensibly wastes away, and condenses: the vitellus, on the contrary, seems to lose little or nothing of its bulk, when the foetus is perfected, and only appears more liquid and humid, when the abdomen of the foetus begins to be formed.

The chick in the egg is first nourished by the albumen; and when this is consumed, by the vitellus, as with milk. If we compare the chalazæ to the extremities of an axis, passing through the vitellus, which is of a spherical form, this sphere will be composed of two unequal portions, its axis not passing through its center; consequently, since it is heavier than the white, its smaller portion must always be uppermost, in all positions of the egg. See CHALAZA.

The yellowish-white, round spot, called cicatricula, is placed on the middle of the smaller portion of the yolk, and therefore, from what has been said in the last paragraph, must always appear on the superior part of the vitellus. See the article CICATRICULA.

Not long before the exclusion of the chick, the whole yolk is taken into its abdomen; and the shell, at the obtuse end of the egg, frequently appears cracked, some time before the exclusion of the chick. The

chick is sometimes observed to perforate the shell with its beak. After exclusion the yolk is gradually wasted, being conveyed into the small guts by a small duct. Aristotle says, that long eggs produce the female, and round the male kind: Scaliger seems to be of the same opinion. Pliny is of the opposite side, for he pretends, that the long eggs are for the males, and the round for the females: but these opinions are supported by no foundation, as the authors give neither good reason nor experiments to prove their respective assertions, and it is very likely that both the round and the long eggs may indifferently produce male and female.

Eggs differ very much according to the birds that lay them, according to their colour, form, bigness, age, and the different way of dressing them: those most used in food, are hens eggs: of these, such as are new laid are best. Galen says, that the best and wholesomest eggs are those of the hen and the pheasant, but he disallows the use of those of the goose and the ostrich. Eggs should be moderately done: some authors also require, that they should be very white and long. Eggs are nourishing and good food, they increase the seminal juices, qualify the sharp humours of the breast, are good for phthical people, easily digest, ease the piles, and are looked upon to be good to make the voice loud and fine. When eggs are too cold, they heat too much, produce bad juice, and are more especially noxious to those who are of a hot and bilious constitution: they contain much oil and salt, and agree at all times with any age and constitution, provided they are endued with the good qualities before-mentioned.

Aquapendente relates several ways how to know whether eggs are new laid or not; he would have them held to a candle, and then see whether the humours contained therein are clear, thin and transparent; for if they be otherwise, it is a sign the eggs are old, because the effervescence has embroiled and confounded the insensible parts of these humours, and made them dark. Lastly, hold an egg to the fire, and if a little watry moisture sticks to it, it is new; if not, it is old; because a new laid egg is moister than the old, and its humours being thinner, work easier through the pores of the shell.

As to the preservation of eggs, it is observed that the egg is always quite full when it is first laid by the hen, but from that time it gradually becomes less and less so, to its decay; and however compact and close its shell may appear, it is nevertheless perforated with a multitude of small holes, though too minute for the discernment of our eyes, the effect of which is a daily decrease of matter within the egg, from the time of its being laid; and the perspiration is much quicker in hot weather than in cold.

To preserve the egg fresh, there needs no more than to preserve it full, and stop its transpiration; the method of doing which, is, by stopping up those pores with matter which is not soluble in watry fluids; and on this principle it is, that all kinds of varnish, prepared with spirit of wine, will preserve eggs fresh for a long time, if they are carefully rubbed all over the shell: tallow, or mutton fat, is also good for this purpose, for such as are rubbed over with this will keep as long as those coated over with varnish.

It was antiently thought, that none but birds and fishes, with some other animals, were produced *ab ovo*, from the egg, but many of the moderns incline to think that all animals, even man himself, is generated that way. In the testes of women, are found little vesicles, about the size of green pease, which are accounted eggs; for which reason, these parts which the antients called testicles, the moderns call ovaries: these eggs, fecundated by the volatile and spirituous part of the seed of the male, are detached from the ovary, and fall down the fallopian tubes into the uterus, where they grow and increase. This system is countenanced by abundance of observations and experiments.

See the article **GENERATION**.

*Artificial method of hatching EGGS.* See the article **HATCHING**.

Other eggs, improperly so called, are the white oblong bodies whereof insects are formed: such are the eggs of flies, gnats, butterflies, &c. which the antients called *vermiculi*. The female fly, after a congress with the male, is seldom so much as twenty-four hours before she begins to deposit her eggs upon some substance proper to give nourishment to the worms that are to be produced from them: these eggs in general are

white and oblong. The gnat arranges her eggs in the form of a small boat; each separate egg is of the form of a ninepin; the thicker end of these are placed downwards, and are all firmly joined to one another by their middles.

**EGG**, in architecture, an ornament in that form, cut in the echinus, or quarter round of the ionic and composite capitals. The profile or contour of the echinus is enriched with eggs and anchors placed alternately.

**EGLANTINE**, in botany, a name frequently given to the sweet-briar, a species of rose. See the article **ROSE**.

**EGLEFINUS**, in ichthyology, the name by which authors call the common haddock, a species of gadus. See the articles **GADUS** and **HADDOCK**.

**EGRA**, a city of Bohemia, situated on a river of the same name, about seventy-five miles west of Prague: east long. 12° 22', north lat. 50° 10'.

It is remarkable for its medicinal waters, esteemed good in hypochondriacal cases, and other diseases arising from infarctions of the bowels. They are gently cathartic, and afford a salt of the same mixture with our Epsom-salt, much used in Germany, and called from the name of the place Egranum Sal.

**EGRIPOS**, the same with Negropont. See the article **NEGROPONT**.

**EGYPT**, an extensive country of Africa, lying between 30° and 36° of east longitude, and between 21° and 31° of north latitude, and bounded by the Mediterranean on the north; by the Red-sea and Isthmus of Suez, which divide it from Arabia, on the east; by Abyssinia or Ethiopia, on the south; and by the deserts of Barca and Nubia, on the west; being six hundred miles in length from north to south; and from one hundred to two hundred in breadth from east to west. Egypt is subject to the grand signior, and governed by a bashaw, or viceroy. It owes its fertility to the annual overflowing of the Nile, which it begins to do in the months of May and June, and is usually at its height in September, from which time the waters decrease till May or June again. By this supply of water, Egypt is rendered so fruitful, as to serve Constantinople, and other places with corn, as it did Rome and Italy of old. They only harrow their grain into the mud, on the retiring of the water, and in March following, usually have a plentiful

plentiful harvest ; and the lands, not sown, yield good crops of grass for the use of the cattle. According to Mr. Sandys, no country in the world is better furnished with grain, flesh, fish, sugar, fruits, melons, roots, and other garden stuff, than the lower Egypt.

**EGYPTEN**, a town of Courland, seventy miles south-east of Mittau.

**EGYPTIANS**. See the article **GYPSIES**.

**EJACULATOR**, a muscle of the penis, otherwise called the elevator.

**EICHTERNAC**, a town of Luxemburg, seven miles north-west of Treves.

**EIDER**, in ornithology, the same with St. Cuthbert's duck. See **DUCK**.

**EJECIT** *infra terminum*. See the article **QUARE EJECIT**.

**EJECTA**, a term used, by lawyers, for a woman deflowered, or cast from the virtuous.

**EJECTION**, in the animal oeconomy, evacuation, or the discharging any thing through some of the emunctories, as by stool, vomit, &c.

**EJECTIONE CUSTODIÆ**, in law, a writ that lies against a person who casts out the guardian from any land during the minority of the heir.

The writ *ravishment de gard* is of the like nature with this ; as is also *droit de gard*.

**EJECTMENT**, *ejectione firmæ*, in law, a writ, or action, which lies for the lessee for years, on his being ejected, or put out of his land before the expiration of his term, either by the lessor, or a stranger. It may also be brought by the lessor against the lessee, for rent in arrears ; or holding over his term, &c. Ejectment of late years is become an action in the place of many real actions, as writs of right, formedons, &c. which are very difficult, as well as tedious and expensive ; and this is now the common action for trial of titles, and recovering of lands, &c. illegally held from the right owner, yet where entry is taken away by disents, fines, recoveries, disseisins, &c. an ejectment shall not be brought ; whereby, we find, that all titles cannot be tried by this action.

The method of proceeding in the action of ejectment is to draw a declaration, and feign therein a lease for three, five, or seven years, to him that would try the title ; and also feign a casual ejector, or defendant, and then deliver the declaration to the ejector, who serves a

copy of it on the tenant in possession, and gives notice, at the bottom, for him to appear and defend his title ; or that he the feigned defendant will suffer judgment by default, whereby the true tenant will be turned out of possession ; to this declaration the tenant is to appear, the beginning of next term, by his attorney, and consent to a rule to be made defendant, instead of the casual ejector, and take upon him the defence, in which he must confess lease, judgment, entry, and ouster, and at the trial stand upon the title only : but in case the tenant in possession does not appear, and enter into the said rule in time, after the declaration served, then, on affidavit being made of the service of the declaration, with the notice to appear, as aforesaid, the court will order judgment to be entered against the casual-ejector by default, and thereupon the tenant in possession, by writ *habere facias possessionem*, is turned out of his possession. On the trial in ejectment, the plaintiff's title is to be set forth from the person last seized in fee of the lands in question, under whom the lessor claims down to the plaintiff, proving the deeds, &c. and the plaintiff shall recover only according to the right which he has at the time of bringing his action. And here, another who hath title to the land, upon a motion made for that purpose, may be defendant in the action with the tenant in possession, to defend his title ; for the possession of the lands is primarily in question, and to be recovered, which concerns the tenant, and the title thereto is tried collaterally, which may concern some other.

**EIENHOVEN**, a town of dutch Brabant, fifteen miles south of Boisleduc.

**EIFIELD**, or **ELFIELD**, a town of lower Saxony, six miles north-west of Mentz.

**EIGHT**, or **PIECE OF EIGHT**. See the article **COIN**.

**EIGHTH** pair of the nerves. See the article **NERVE**.

**EIMBECK**, a town of lower Saxony, belonging to the elector of Hanover, twenty-five miles south of Hildesheim.

**EINECIA**, the same with *esnechy*. See the article **ESNECY**.

**EIRE**, or **EYRE**, among lawyers. See the article **EYRE**.

**EISLEBEA**, a town of Upper Saxony, five miles east of Mansfield, remarkable for being the birth-place of Luther.

**EISNACH**, or **EYSNACH**. See the article **EYSNACH**.

**ELABORATORY**, the same with laboratory. See the article **LABORATORY**.

**ELÆAGNUS**, **DUTCH MYRTLE**, in botany, a genus of trees, belonging to the *tetrandria-monogynia* class of Linnæus, the characters of which are, that it has no flower-petals; the fruit is an oval, obtuse, and smooth drupe, including an oblong kernel or nut.

As to the medicinal virtues of its leaves, which are the only parts in use, they are reputed drying, discutient, and good against worms.

**ELÆAGNON** of **THEOPHRASTUS**, the same with the *agnus castus*, or *vitex*. See the article **AGNUS**.

**ELÆOMELI**, among antient physicians, a sweet-tasted oil, of the consistence of honey, said to flow from the trunk of a tree in Syria, and to purge bilious humours.

**ELÆOSACCHARUM**, in pharmacy, a preparation of some essential oil with sugar, thus performed: grind an ounce of dry loaf-sugar to an impalpable powder, in a glass-mortar, and with a glass-pestle, and by degrees add thereto a dram of any essential oil, or only half a dram, if the oil be very tenacious; and continue rubbing them together, till all the oil be thoroughly mixed, and drank in by the sugar. If a little fresh white of an egg be added in the grinding, the oil becomes thereby more easily miscible; but the mixture will not keep so long, without turning rancid.

If these elæosaccharums be well prepared, dried, and put into clean glasses, exactly closed with glass stopples, they may be preserved a long time perfect. By this method, therefore, you may prepare an excellent medicine, rich in virtues: for if the elæosaccharum of mint be dissolved in distilled mint-water, then strengthened with the addition of spirit of mint, and the mixture sweetened with the syrup of the same plant, the whole virtues of mint may be thus obtained. *Boerhaave*.

**ELÆOTHESIU**Μ, *ἐλαίοθσιον*, in antiquity, the anointing-room, or place where those who were to wrestle, or had bathed, anointed themselves. See **GYMNASIU**Μ.

**ELAPHEBOLIUM**, *ἐλαφεβόλιον*, in grecian antiquity, the ninth month of the athenian year, answering to the latter part of February and beginning of March. It consisted of thirty days, and took its name from the festival elaphebolia, kept

in this month, in honour of Diana the huntress; on which occasion, a cake made in the form of a deer, was offered to her.

**ELAPHOBOSCU**Μ, a name sometimes used for the parsnep. See **PARSNEP**.

**ELAPHOCAMELU**Σ, in zoology, the same with the glama, or peruvian camel. See the articles **CAMEL** and **GLAMA**.

**ELAPS**, or **ELAPHIS**, in zoology, a species of serpent, with longitudinal black lines running along the back from the head to the tail. See **SERPENT**.

**ELASMIS**, in natural-history, a genus of talcs, composed of small plates in form of spangles, and either single, and not farther fissile, or, if complex, only fissile to a certain degree, and that in somewhat thick laminæ. See the article **TALC**.

Of these talcs there are several varieties, some with large and others with small spangles, which differ also in colour, and other peculiarities.

**ELASTIC**, in natural philosophy, an appellation given to all bodies endowed with the property of elasticity. See the next article.

**ELASTICITY**, or **ELASTIC FORCE**, that property of bodies wherewith they restore themselves to their former figure, after any external pressure; being the same with what is otherwise called springiness, very observable in a bent bow, steel springs, and the like.

A perfectly elastic body, is that which restores itself with the same force wherewith it was bent, or depressed; those which do not so restore themselves with exactly the same force, being called imperfectly elastic bodies.

Philosophers account for elasticity from the principles of corpuscular attraction and repulsion: thus, if a steel spring, wire, or piece of very thin glass, be bent out of its natural position, the particles on the convex part are forced from the intimate union they had before; and, on the concave part, they are forced nearer together, or harder upon each other, than in the natural state: in both which cases, there will be a considerable resistance to overcome, and consequently require a superior force. During this state of the particles, they may be said to be under a sort of tension on one side, and compression on the other; and since by this force they are not drawn out of each others attraction, as soon as the force is remitted or ceases to act, the attractive power reduces the particles, and unbends the wire. Now it is well known, that many sub-



Fig. 1. The Common EEL.

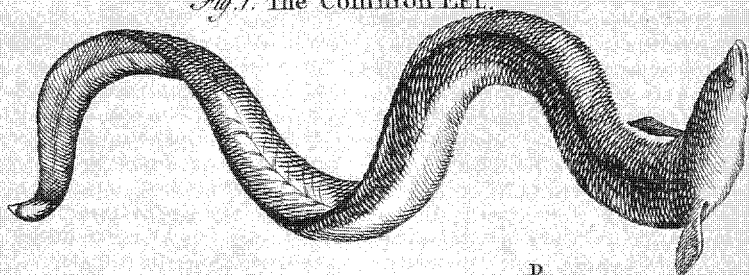
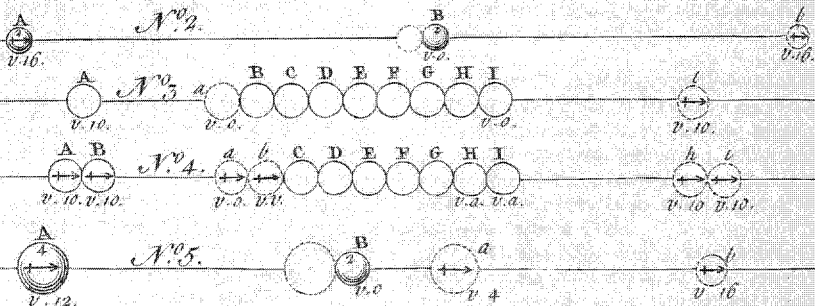
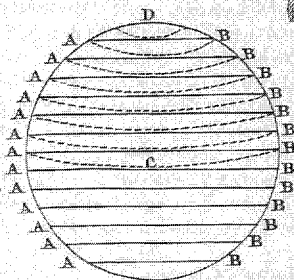
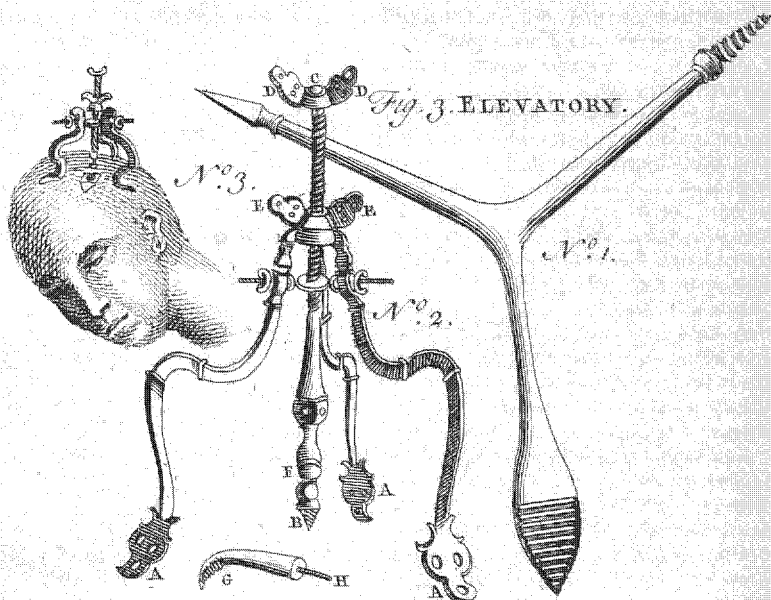
Fig. 2. ELASTICITY. N<sup>o</sup> 1.

Fig. 3. ELEVATORY.





substances are composed of such fibrous parts or filaments which resemble fine wires, and are interwoven and disposed in such a manner, as in sponge, for instance, that they cannot be compressed without being bent or wrested from their natural position; whence all such bodies will, in such cases, exert a spring or force to restore themselves, in the same manner that the bent wire did.

All bodies that we know of, are in some degree or other elastic, but none of them perfectly so; such are most metals, semi-metals, stones, and animal and vegetable substances, however they may differ in degree. Elasticity seems to vary, according to the different densities of bodies; for the more metals are hammered, the more elastic they become; and the elasticity of the hardest tempered steel to that which is soft, may be found to be as 7809 to 7738.

We may consider all elastic bodies to be made up of such strings or fibres as AB (plate LXXXV. fig. 2. n° 1.) or rather of elastic strata parallel to each other, represented by AB, in the ball DC. If this ball be struck at D by a hard or elastic body, all the strata will be bent in towards C, as expressed by the dotted lines, whilst the ball is flattened or dented at D. But the strata quickly restoring themselves, the surface of the ball re-assumes its first figure, and that more or less exactly, according as the elasticity is more or less perfect.

The great law of perfectly elastic bodies, is, that their relative velocity will remain the same before and after collision; that is, perfectly elastic bodies will recede from one another after the stroke, with the same velocity that they came together. Many curious phænomena may be explained from this property in bodies.

If the ivory ball A, (*ibid.* n°. 2.) weighing two ounces, strike with the velocity 16 against B at rest, weighing also two ounces, the body B will move forward after the stroke with the velocity 16, A remaining at rest in its place. The reason of this is, that the body A loses one half of its motion by striking the equal body B, and the other half by the elasticity of B, recovering its former figure. From this experiment, several pretty odd phænomena arise: thus, if a row of shovel-board pieces (that is, metalline cylinders of about half an inch in height, and two inches diameter) be laid upon a smooth table, and you take a single

piece, and drive it against the row, the last piece of the row will fly off; for if A (*ibid.* n° 3.) strike the row of pieces B, C, D, E, F, G, H, I, in the direction Aa, then will the last piece I fly off to i with the same velocity that A struck B: and whatever be the velocity of A, no other piece but the last piece I will fly off. But if you take two pieces, as A and B, (*ibid.* n° 4.) and strike them together against the row C, D, E, F, G, H, I, the two last pieces, H and I, will fly off from the other end of the row with the same velocity that A and B made the stroke.

If three or more pieces are made use of to make the stroke, the very same number will fly off from the other end of the row; and, it is to be observed, that the same will happen with equal elastic balls, suspended in a row by strings of the same length.

Again, if the elastic body A, (*ibid.* n° 5.) weighing four ounces, strike the quiescent body B, weighing only two ounces, with a velocity equal to 12; then will the velocity of A, after the stroke, be 4, and that of B 16. Just the reverse of this happens, when a lesser body strikes against the greater; in which case, the striking or lesser body will be reflected with one fourth of its first motion, and the greater be carried forward with a motion which is as 16.

The magnitude and motions of spherical bodies perfectly elastic, and moving in the same right line, and meeting each other, being given, their motion after reflection may be determined thus: let the bodies be called A and B, and the respective velocities  $a$  and  $b$ ; then, if the bodies tend the same way, and A, moving swifter than B, follows it, the velocity of the body A, after the reflection, will be

$aA - aB + 2bB$   
 $\frac{A + B}{}$ , and that of the body  
 $B = \frac{2aA - bA + bB}{A + B}$ ; but if the bodies meet, then, changing the sine of  $b$ , the velocity of A will be  $\frac{aA - aB - 2bB}{A + B}$ ,

and that of B =  $\frac{2aA + bA - bB}{A + B}$ : and if

either of these happen to come out negative, the motion after the stroke tends the contrary way to that of A before it; which is also to be understood of the motion of the body A, in the first case.

**ELATE**, in botany, the same with the phoenix of Linnæus. See **PHOENIX**.

**ELATER**, in zoology, a genus of four winged flies, of the order of the coleoptera; the body of which is oblong, and the antennæ letaceous: add to this, that the creature, when laid on its back, leaps with great agility.

There are a great many species of elater, distinguished by their different colours, as red, brown, green, blue, and black; which, in some species, are variously blended together.

**ELATERIUM**, in botany, a name by which Boerhaave calls the momordica of other botanists. See **MOMORDICA**.

**ELATERIUM**, in pharmacy, imports, in general, any purging medicine; but is particularly applied to those which operate with violence. Hence the word was transferred to the wild cucumber, and the preparations thereof. See the article **CUCUMBER**.

In the writings of Hippocrates, elaterium is frequently mentioned as an external application, of a digestive and detergent nature.

**ELATINE**, **FLUELLIN**, in botany, a genus of the *clandria-tetragynia* class of plants, the corolla of which consists of four ovated, obtuse, sessile, patent petals: the fruit is an orbiculated great capsule, compressed globeways, containing four cells, and consisting of four valves: the seeds are numerous, lunulated, erect, and surrounding the receptacle in the manner of a wheel. This plant is an aperient, resolvent, and vulnerary.

**ELATINE** is also used by Dillenius for antirrhinum, or snapdragon. See the article **SNAPDRAGON**.

**ELAWANDUM**, in zoology, a species of monkey with whitish-grey hair, and a long black beard.

**ELBE**, a large river in Germany, which, rising on the confines of Silesia, runs through Bohemia, Saxony, and Brandenburg; and afterwards dividing the dutchy of Lunenburg from that of Mecklenburg, as also the dutchy of Bremen from Holstein, it falls into the german ocean, about seventy miles below Hamburgh.

It is navigable for great ships higher than any river in Europe.

**ELBOW**, in anatomy, the juncture of the cubitus and radius; or the outer angle made by the flexure or bend of the arm. See **CUBITUS** and **RADIUS**.

**ELBOW**, in architecture, a term used for

an obtuse angle of a wall, building, road, &c. which divides it from its right line.

**ELCESAITES**, in church-history, antient heretics, who made their appearance in the reign of the emperor Trajan, and took their name from their leader Elcesai. The elcesaites kept a mean between the jews, christians, and pagans; they worshipped but one God, observed the jewish sabbath, circumcision, and the other ceremonies of the law. They rejected the pentateuch, and the prophets; nor had they more respect for the writings of the apostles, particularly those of St. Paul. They detested chastity and continence, and obliged their disciples to marry. They acknowledged a messiah, whom they called their great king; but we do not know whether they meant Jesus Christ, or some pretended messiah. They gave him a human form, but invisible, the dimensions of which were thirty-eight leagues in height, and so in proportion. They pretended that the Holy Ghost was a woman, and of the same size with the messiah. They were much addicted to judicial astrology, magic, and enchantments. They held that it is lawful to renounce the faith with the lips, provided a man kept it in his heart.

**ELDER**, or **SENIORS**, in jewish history, were persons the most considerable for age, experience, and wisdom. Of this sort were the seventy men whom Moses associated to himself in the government of his people; such, likewise, afterwards were those who held the first rank in the synagogue, as presidents.

In the first assemblies of the primitive christians, those who held the first place, were called elders. The word presbyter, often used in the New Testament, is of the same signification: hence the first councils of christians were called presbyteria, or councils of elders.

**ELDER** is also a denomination still preserved in the presbyterian discipline. See the article **PRESBYTERIAN**.

They are officers who, with the ministers and deacons, compose the sessions of the kirk. The elder's business is to assist the minister in visiting the congregation upon occasion, to watch over the morals of the people of his district, and to give them private reproof in case of any disorder; but if the scandal be gross, or the person obstinate, he lays the thing before the session. The elders are chosen from among the most substantial, knowing, and regular people, by the session or consistory

istory of the kirk. There is a ruling elder in every session ; he should be a man of spotless character, and of principal consideration and interest in his parish : he is chosen out of the kirk-session : the congregation is to approve of the choice : the minister ordains him before the congregation : he may be chosen to assist in any church judicatory, and in all manner of government and discipline, has an equal vote with the minister.

ELDER, or ALDER, *alnus*, in botany. See the articles ALDER and ALNUS.

ELECAMPANE, *belemium*, is ranked by botanists among the star-worts. See the article ASTER.

The virtues of elecampane are much cried up, as a stomachic, alexipharmic, and sudorific ; and therefore prescribed in crudities of the stomach, the cough, asthma, plague, and other contagious diseases. Externally, it is recommended against the itch, convulsions, and rheumatism.

ELECT, *electi*, among ecclesiastical writers, those whom God has chosen, or predestinated to be saved. See the article PREDESTINATION.

ELECT, in matters of polity, is applied to archbishops, and other ecclesiastical officers, who are chosen, but not yet consecrated ; as also to secular officers before they are invested with their office or jurisdiction : thus the emperor is said to be elect, before he is inaugurated ; and the lord mayor, before his predecessor's mayoralty is expired.

ELECTARY, the same with electuary. See the article ELECTUARY.

ELECTION, the choice that is made of a person, or thing, in preference of any other ; as in the election of an emperor, of a pope, of a bishop, of members of parliament, &c. See EMPEROR, CONCLAVE, BISHOP, and PARLIAMENT.

ELECTION is also the state of a person who is left to his own free will, to take or do one thing or another, which he pleases. If a person makes a lease of land rendering so much money in rent, or a quarter of corn, &c. the lessee shall have his election which he will render, as being the first agent, by payment of the one, or delivery of the other. Where nothing passes to a grantee before election, to have one thing or the other, and no time is appointed, the election ought to be made during the life of the parties, and not afterwards : but where an estate conveys immediately to the grantee, or donee, &c.

in that case, election may be made by them, or their heirs and executors. And when a donee, or grantee, has his election in what manner he will take the thing granted, there the title or interest passes immediately, and the party and his heirs, &c. are at liberty to make the election when they will.

ELECTION of a clerk of statutes-merchant, is the writ that lies for the choice of a clerk, to take bonds, called statutes-merchant ; and issues out of the court of chancery, upon suggestion that the clerk formerly assigned is gone to dwell in another place, or is under some impediment to attend the duty of his office.

ELECTION of ecclesiastical persons. There is to be a free election for the dignities of the church, in which no person shall give any disturbance, on pain of forfeiture. Where any person that has a vote in such elections take any reward for an election in any church, college, school, &c. the election shall be void.

ELECTION of a verderer of the forest, a writ which lies for the choice of a verderer, on the death or removal of any such officer of the forest. It is directed to the sheriff, and the verderer is to be elected by the freeholders of the county.

ELECTION, in theology, signifies the choice which God, of his good pleasure, makes of angels and men for the objects of his grace and mercy. See GRACE, REPROBATION, and PREDESTINATION.

ELECTION is also used, by some medical writers, as a part of pharmacy, which consists in a knowledge of the various simples which compose the materia medica, and directs the choice of drugs.

ELECTION, in numbers, is, with regard to combinations, the different ways of taking any number of quantities given : thus, the quantities *abc* may be taken different ways, as *abc*, or *ab*, *ac*, and *a*, *b*, *c*.

ELECTIVE, something that is determined by election. See the preceding article.

The empire of Germany is elective, as is the kingdom of Poland ; and among us, the magistrates of cities, and other corporate-towns, members of parliament, &c. are elective.

ELECTOR, a person who has a right to elect or choose another to an office, honour, &c.

Electors are particularly, and by way of eminence, applied to those princes of Germany in whom lies the right of electing the emperor : being all sovereign princes, and the principal members of the empire.

The

The electoral college, consisting of all the electors of the empire, is the most illustrious and august body in Europe. Bellarmine and Baronius attribute the institution of it to pope Gregory V. and the emperor Otho III. in the tenth century ; of which opinion are the generality of historians, and particularly the canonists : however, the number of electors was unsettled, at least, till the thirteenth century. In 1356 Charles IV. by the golden bull, fixed the number of electors to seven ; three ecclesiastics, *viz.* the archbishops of Mentz, Treves, and Cologne ; and four seculars, *viz.* the king of Bohemia, count Palatine of the Rhine, duke of Saxony, and marquis of Brandenburg. In 1648 this order was changed, the duke of Bavaria being put in the place of the count Palatine, who having accepted the crown of Bohemia, was out-lawed by the emperor ; but being, at length, restored, an eighth electorate was erected for the duke of Bavaria. In 1692, a ninth electorate was created, by the emperor Leopold, in favour of the duke of Hanover, of the house of Brunswick Lunenburg.

There is this difference between the secular and ecclesiastic electors, that the first have an active and passive voice, that is, may choose and be chosen ; the last, an active only. The three archbishops are to be thirty years old, before they can be advanced to the dignity ; the seculars, eighteen, before they can perform the office themselves. These last have each their vicars, who officiate in their absence.

Besides the power of choosing an emperor, the electors have also that of capitulating with, and deposing him ; so that, if there be one suffrage wanting, a protest may be entered against the proceedings. By the right of capitulation, they attribute to themselves great privileges, as making of war, coining, and taking care of the public interest and security of the states ; and the emperor promises, upon oath, to receive the empire upon these conditions.

The electors have precedence of all other princes of the empire, even of cardinals and kings ; and are addressed under the title of electoral highness.

Their several functions are as follow : the elector of Mentz is chancellor of Germany, convokes the states, and gives his vote before any of the rest. The elector of Cologne is grand chancellor of Italy, and consecrates the emperor. The elector of

Treves is chancellor of the Gauls, and confers imposition of hands upon the emperor. The count Palatine of the Rhine is great treasurer of the empire, and presents the emperor with a globe at his coronation. The elector of Bavaria is great master of the imperial palace, and carries the golden apple. The marquis of Brandenburg is grand chamberlain, and puts the ring on the emperor's finger. The elector of Saxony is grand marshal, and gives the sword to the emperor. The king of Bohemia is grand butler, and puts Charlemaign's crown on the emperor's head. Lastly, the elector of Hanover, now king of Great Britain, is arch treasurer, though first erected under the title of standard-bearer of the empire.

**ELECTORAL**, in general, something belonging to electors. See **ELECTOR**.

**ELECTORAL CROWN**, or **CORONET**. See the article **CROWN**.

**ELECTORATE**, a term used as well to signify the dignity of, as the territories belonging to, any of the electors of Germany : such are Bavaria, Saxony, &c. Contrary to the common usage of Germany, the electorate, or territories belonging to electors, is hereditary ; passing entire to the eldest son.

**ELECTRICITY**, in physiology, that property of certain bodies, whereby, after being rubbed, excited, or heated in some particular degree, they acquire a power of attracting and repelling other remote bodies ; and frequently of emitting sparks and streams of light.

The ancients, having observed that amber, which they called *electrum*, upon being rubbed, attracts bits of straw, down, and other light bodies, first gave this property the name of electricity, which they thought peculiar to amber and a few stones mentioned by Theophrastus, Pliny, and some others. But the philosophers of the last, and more particularly of the present age, have found that numbers of other bodies possess this quality ; and made so many discoveries in electricity, that there is scarce any other subject in natural philosophy that has given occasion to more experiments.

This quality is of two sorts, *viz.* vitreous electricity, or that which belongs to glass ; and resinous electricity, or that which belongs to amber, rosin, wax, gum, and such like substances.

The bodies susceptible of electricity, are also divided into two classes : the one are electrical of themselves, or *electricæ per se* ; that

that is, they contain that quality in themselves, and need only be rubbed, &c. to excite it : the others do not contain that virtue in themselves, or they have so little of it, as to be reckoned to have none at all ; yet they acquire it by communication, or by emanation derived to them by a body that is electrical *per se* : those bodies are simply called non-electrics, or *non electrica per se*.

The electrics *per se*, or, as they are otherwise called, the originally electrics, are, according to Muschenbroeck, all sorts of gems, several stones, all crystals and resinous substances, sulphur, red arsenic, salts, alum ; all sorts of glass, porcellane, dried vegetables ; all woods, ropes, threads of lint, paper, the leaves of trees, the harder resins, pitch, cotton ; parts of animals, as their feathers, hair, horns, bones, ivory, whale-bone, the hide, parchment, the shells of fishes, silk, strings made of dried guts, gum, sealing-wax, feathered or hairy living animals, as cats, dogs, cocks, &c.

The non-electrics are several naked animals, or such as are covered with neither hair nor feathers ; metals, semi-metals, earths and dust, which, by reason of its minuteness, won't bear to be rubbed separately ; all watry gums, opium, galbanum, ammoniac, assafoetida, camphor ; all sorts of bodies that liquify with a small heat, all moist bodies, all fluids which will not bear rubbing, &c.

Electricity, according to the same author, consists in subtle exhalations, which, in exciting the electrical body, are put into motion ; and which, by flying to and from it, agitate all those light bodies that fall within the sphere of their attraction.

That these exhalations, or subtle effluvia, constitute electricity, appears from hence.

1. From the touch, as these bodies are perceived to be surrounded with a most subtle atmosphere, or covered with a gentle blast of wind, that continues to breathe every where around them. 2. From that offensive smell, which resembles phosphorus, the phlegm of aqua regia, or the spirit of vitriol. 3. Being taken into the mouth, they yield an acid and astringent taste. 4. They seem to adhere to the extremities of the bodies which they surround, and from which they recede, in the form of sparks, and of a subtle lucid flame. 5. This flame is sometimes attended with an explosion, that may be heard at the distance

of two hundred paces : besides, the greater flames occasion a continued hissing, or crackling noise in the air. Since, therefore, the electrical effluvia affect all the human senses, we can no longer doubt of their being a corporeal fluid.

Mr. Watson thinks, that electricity is not furnished from the electric bodies employed in the experiments, nor from the circumambient air ; but that it is the effect of a very subtile and elastic fluid occupying all bodies, in contact with the teraqueous globe ; that every where, in its natural state, it is of the same degree of density ; that glass and other bodies, which are electrics *per se*, have the power of taking this fluid from one body and conveying it to another, in a quantity sufficient to be obvious to all our senses ; that, under certain circumstances, it is possible to render the electricity in some bodies more rare than it naturally is, that, by communicating this to other bodies, to give them an additional quantity, and make their electricity more dense ; and that these bodies will thus continue, until their natural quantity is restored to each ; that is, by those which have lost part of theirs, acquiring what they have lost, and by those to whom more has been communicated, parting with their additional quantity. Both one and the other of these is, from the elasticity of the electric matter, attempted to be done from the nearest non-electric ; and when the air is moist, this is soon accomplished by the circumambient vapours, which here may be considered as preventing, in a very great degree, our attempts to insulate non-electric bodies.

In order to illustrate the phenomena of electricity, we shall give some select experiments.

1. Get a glass tube AB, of about three feet and a half in length, an inch and a half in diameter, and its sides a line thick : rub it with a piece of stuff, paper, or, which is still better, with the hand, provided it be very dry : you will succeed better if your hands be rubbed with chalk, or white lead. Afterwards bring this rubbed tube near any light bodies, as gold-leaf laid upon a glass stand CD ; then will the gold-leaf be attracted and repelled in the manner represented in plate LXXXVI. fig. 1.

If you do this in such a manner, that the gold-leaf, for example, be perpendicularly repelled above the tube, and that

it meet with no other body, it will sustain itself in the air, always at the same distance from the tube, and may be conveyed in this situation quite round the room; but if it touch any other body, it will come back and adhere to the tube, and then it will be repelled anew as at the first.

2. Again, if the tube be rubbed anew, pretty briskly, it will attract a feather, or other light body, at a considerable distance; and after they have stuck to it for some time, they are again driven off, and it will constantly repel them, till they are touched by some other non-electrical body, as a finger or stick: on which they will be again attracted by the tube; and if the finger be held pretty near the tube, the feather will alternately fly from the tube to the finger, and back again; always stretching out its fibres the way that it is going, and that before it comes off from the finger or tube. See plate LXXXVI. n° 2.

Before we proceed to more complicated experiments, it will be proper to observe, that, in order to know that non-electrics have received the communicated electricity, they must be insulated: that is, they must not be suspended from, nor supported by any body, but what is an electric *per se*. For if one non-electric be touched by another, and this by a third, &c. all the electricity received by the first will go to the second, and from this to the third, &c. till at last it be lost upon the ground. But, if several non-electric bodies, touching one another, are at length terminated by electric bodies, in that respect they make but one body, and receive and retain electricity for some time. From hence it may be observed, that non-electrics are conductors of electricity. Water conducts it very well, but metals are the most convenient conductors.

3. Let an iron-rod, pointed at one end, be suspended on silk lines, and by means of a glass or rosin-sphere (which can be more regularly and constantly excited than a tube) be electrified, it will be found to have all the properties of the excited tube already mentioned: that end of the iron-rod, suspended as already mentioned, which is next the sphere, must point to it at the distance of a quarter of an inch. This apparatus being disposed, as represented, *ibid.* n° 3. the globe will be electrified in whirling round against a leather cushion rubbed with whiting, or dry hand-rubbed in the same

manner. When the rod, by this means, is strongly electrified, a stream of light, in diverging rays, will be seen to issue from that point of it which is most distant from the sphere; and if any non-electric body, as a finger, be placed within a quarter of an inch of the said flame, it will perceive a gentle blast of wind from the end of the iron; that is, the electrical fire will issue out from the point in such a manner, as to blow against the finger very sensibly; and if the finger be still held nearer, the large pencil of rays will be condensed in such a manner, as to run out from the point upon the finger, in a stream or body of dense, yellow fire, and strike the finger like a gentle *jet d'eau*. The rod suspended before the glass-sphere, is properly termed the prime conductor in this machine.

4. While the flame continues to appear from the end of the iron-rod, the finger being placed any where upon it, the flame at the end disappears immediately; and when the finger is taken off, it again instantly appears; and so by putting the finger off and on successively, the electric flame will appear and disappear alternately. These eruptions of the electrical fire will snap very sensibly, both to the eye and the ear, upon any part of the rod that the finger is pointed to. See plate LXXXVI. n° 3.

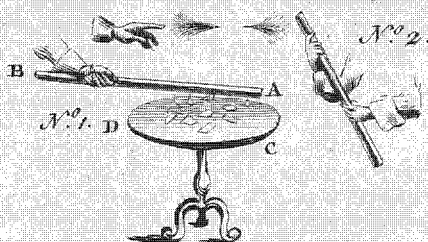
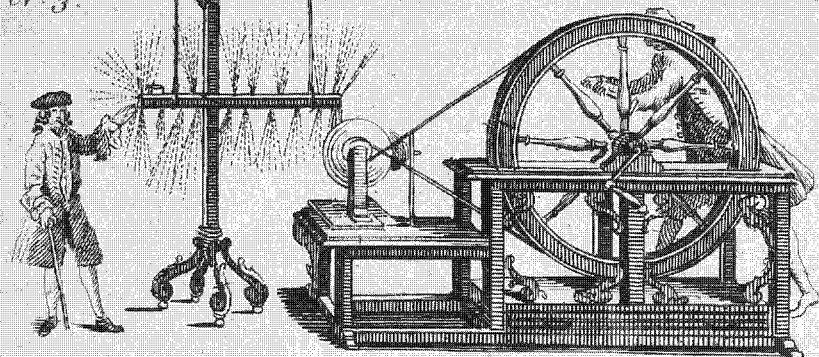
5. If a chain, or hempen cord, be suspended by silken strings all round the room, of any length you please, and one end thereof be hung, by a loop, across the rod, the electrical fire will instantly be transmitted through the whole length of the chain, and appear upon every part at the approach of the finger, and be heard to snap and strike with as great force as from the rod itself.

6. Take two plates of metal, very clean and dry, whose surfaces are nearly equal; hang one of them horizontally to the electrified rod, and bring under it, upon the other, any thin light body, as silver leaf, &c. When the upper plate is made electrical, the silver will be attracted by it; and if the under plate is held at a proper distance, will be perfectly suspended at right angles to the plates, without touching either of them; but if they are either brought nearer together, or carried farther asunder, the leaf will cease to be suspended, and will jump up and down between them.

The same effect will be produced, if the experiment is reversed by electrifying the bottom

ELECTRICITY.

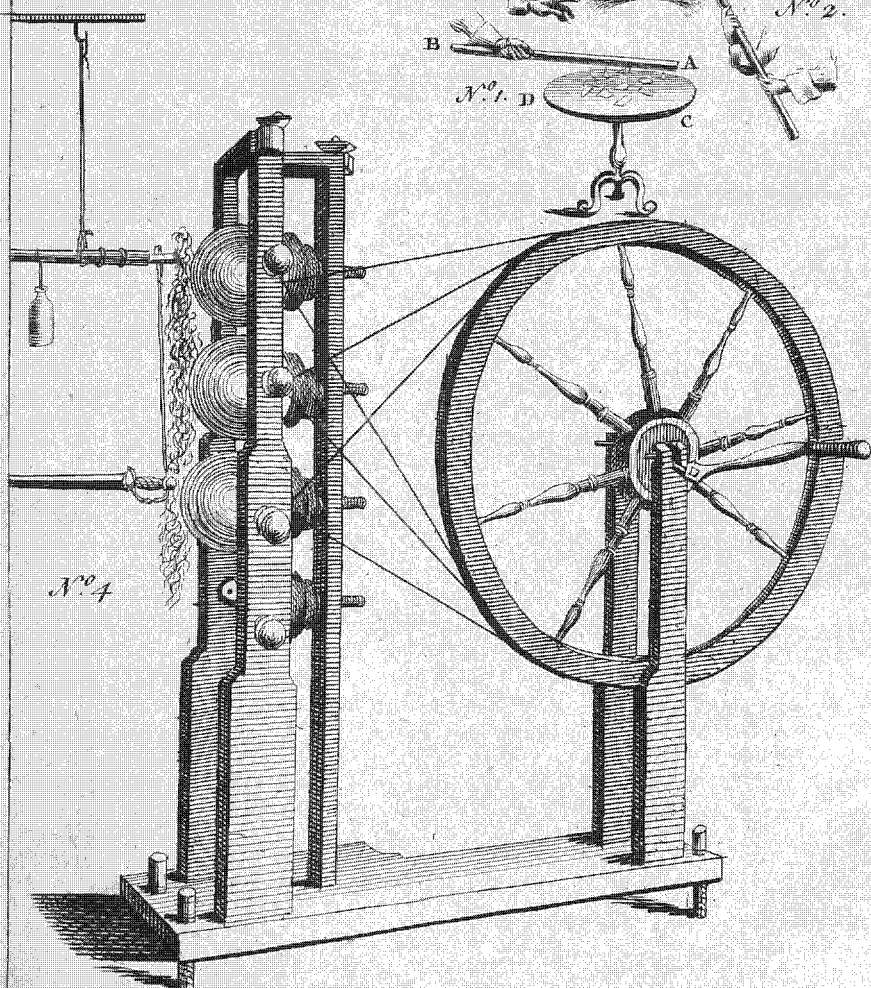
N<sup>o</sup> 3.



N<sup>o</sup> 1. D

N<sup>o</sup> 2.

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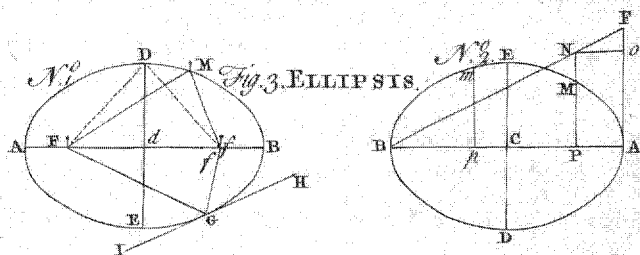
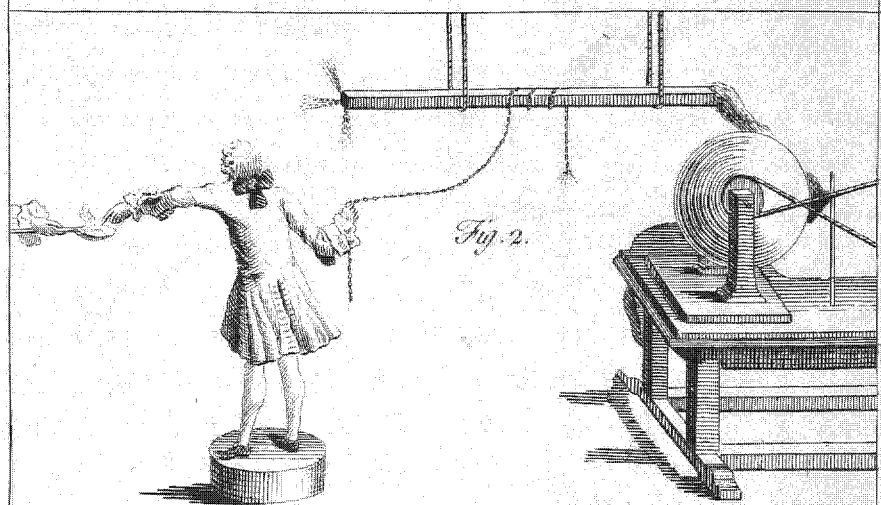
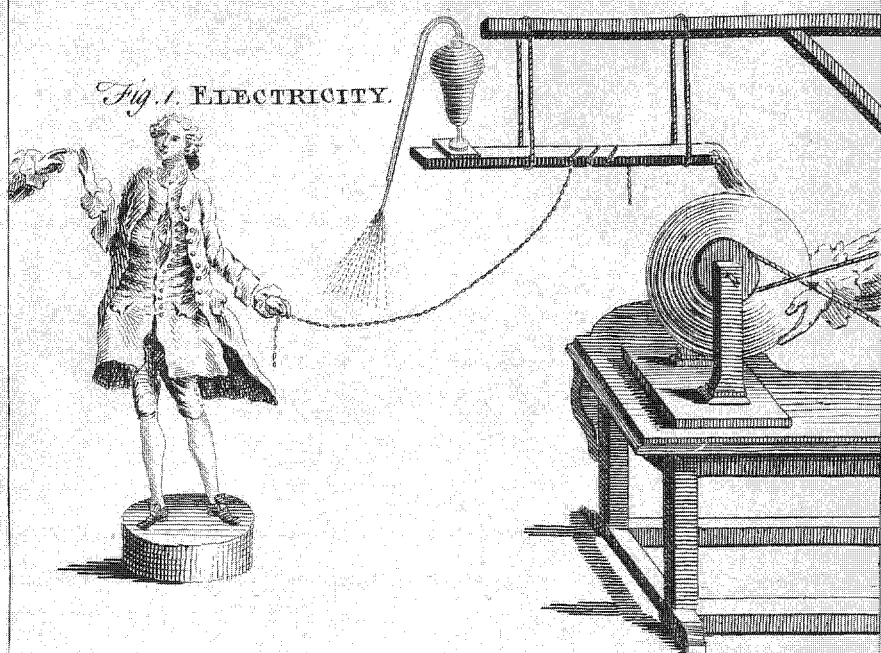


J. Jefferys sculp.









bottom plate, and suspending the other over it.

7. The following improvement, upon the electrical machine of the abbe Nollet, already exhibited, was made by Mr. Wat-son in 1746. In the periphery of his machine, see plate LXXXVI. n<sup>o</sup> 4. were cut four grooves, corresponding with four globes, which were disposed vertically: one, two, or the whole number of these globes might be used at pleasure. They were mounted upon spindles, and the leather-cushion with which they were rubbed, was stuffed with an elastic substance, as curled hair, and rubbed over with whiting. One of the globes was lined to a considerable thickness with a mixture of wax and rosin; but no difference appeared in the power of this globe from the others.

For performing most of the following experiments, some have imagined a gun-barrel absolutely necessary, as the prime conductor; but Mr. Wat-son says, that a solid piece of metal, of any form, is equally useful; having observed the stroke from a sword, as violent as that from a gun-barrel.

If, to the suspended barrel, a sponge, thoroughly dry, be hung, it gives no appearance of fire, which shews it to be an electric substance; but if when the sponge has been immerged in water, it be suspended to the barrel, and the finger applied near it, the fire issues out with considerable force and snappings; and the drops, which, before the sponge was applied, fell very slowly, will now fall as fast: if the room be darkened, these drops will appear to be drops of fire, and illuminate the basin into which they fall.

8. If a phial of water is suspended to the prime conductor by a wire, let down a few inches into the water through the cork; and some metallic fringes, inserted into the barrel, touch the globe in motion, the electrical power may be so accumulated in the phial, that a man grasping it with one hand, and touching the gun-barrel with a finger of the other, will receive a violent shock through both his arms, especially at his elbows and wrists, and across his breast. The commotion arising from the discharge of accumulated electricity in a phial, may be felt by a great number of men at once. M. le Monnier, at Paris, is said to have communicated this shock through a line of men, and other non-electrics, measuring nine hundred toises, being more than an english mile;

and the abbe Nollet made the experiment upon two hundred persons ranged in two parallel lines.

9. If the electrical machine, and the man who turns the wheel thereof, be mounted on electrical cakes, the electrical power is so far from being increased, that, on the contrary, it is so much diminished, as to be oftentimes not at all perceptible.

10. A person standing on a cake of rosin, holding a chain fastened to the prime conductor, will be electrized; that is, he will be all over possessed with electric virtue; and, at the same time, feel nothing of it, unless some person standing by put his finger near to any part, and then the virtue will be emitted in form of fire, and snap and become very sensible to both the parties. See plate LXXXVII. fig. 1.

11. A person standing on rosin, holding the chain of the conductor, points his finger to the warm spirits of wine; and by communicating the electric fire thereto, kindles the rising vapour, and so sets the whole on fire. In this manner any sort of matter, which, when warmed, will send forth an inflammable vapour, will be set on fire. See plate LXXXVII. fig. 2.

The electrical commotion, mentioned in experiment 8, arising from an accumulation of the electrical fire, has been made very sensible quite cross the river Thames, by the communication of no other medium than the water of that river, and spirit of wine fired at that distance.

By comparing the respective velocities of electricity and sound, that of electricity, in any distance yet experienced, appears instantaneous.

12. If the globe be exhausted of all its air, and then whirled about, the electricity will be observed to act wholly within the globe, where it will appear, in a darkened room, in form of a cloud or flame of reddish or purple-coloured light, filling the whole capacity of the globe.

13. If a loadstone, armed with iron, be hung on to the gun-barrel by an iron-wire, the electric virtue will rush out from every part, but more forcibly from the iron than from the stone itself: for from the stone, it seems to be emitted in a more lax manner, and diffused in a sort of steam, or fiery vapour; whereas from the iron, it issues in a more impetuous, dense, and penetrating steam; by which we learn, that the two most considerable powers of nature, electricity and mag-

netism, do not always interfere, or impede each other's actions.

14. The method of firing gunpowder by the electric flame, has something particular in it; as it does not require any inflammable vapour to be previously raised. The powder may be fired thus: a small cartridge is filled with dry powder, hard rammed, so as to bruise some of the grains: two pointed wires are then thrust in, one at each end, the points approaching to each other in the middle of the cartridge, till within the distance of half an inch: then the cartridge being placed in the circle, when four electrified glass-jars are discharged, the electric flame leaping from the point of one wire to the point of the other within the cartridge, among the powder, fires it, and the explosion of the powder is at the same instant with the crack of the electrical discharge.

15. As to metals, Mr. Franklin tells us, that he has been able, by electricity, to give polarity to needles, and to reverse it. A shock from four large glass-jars sent through a fine sewing needle, gives it polarity.

16. In consequence of Mr. Franklin's hypothesis, of being able, by a proper apparatus, to collect the electricity from the atmosphere during a thunder-storm, it has been found, that a pointed bar of iron, forty feet high, being placed upon an electric body; and a stormy cloud having passed over the place where the bar stood, those, appointed to observe it, attracted from it sparks of fire, perceiving the same kind of commotions as in the common electrical experiments. The like effect followed when a bar of iron ninety-nine feet high was placed upon a cake of rosin two feet square, and two inches thick: these were the first experiments made, but they have since been sufficiently varied and verified, so that it seems now certain, 1. That a bar of iron, pointed or not, is electrized during a storm. 2. That a vertical, or horizontal situation, is equally fitting for these experiments. 3. That even wood is electrized. 4. That, by these means, a man may be sufficiently electrized to set fire to spirit of wine with his finger, and repeat almost all the usual experiments of electricity.

17. Mr. Franklin has contrived a very ingenious and easy method of trying experiments of this kind, by means of an electrical kite, made of a large thin silk

handkerchief, extended and fastened, at the four corners, to two slight strips of cedar, of sufficient length for this purpose. This kite being accommodated with a tail, loop, and string, will rise in the air like those of paper. To the top of the upright stick of the cross, is to be fixed a very sharp-pointed wire, rising a foot or more above the wood. To the end of the twine, next the hand, is to be tied a silk ribband; and, where the twine and silk join, a key may be fastened. The kite is to be raised when a thunder-gust appears to be coming on; and as soon as the thunder clouds come over the kite, the pointed wire will draw the electric fire from them, and the kite, with all the twine, will be electrified; and the loose filaments of the twine will stand out every way, and be attracted by an approaching finger. When the rain has wet the kite and twine, so that it cannot conduct the electric fire freely, it will stream out plentifully from the key on the approach of a man's knuckle. At this key a phial may be charged; and from the electric fire, thus obtained, spirits may be kindled, and all the other electrical experiments be performed, which are done by the help of a glass-sphere or tube; and the sameness of the electric matter with that of lightning, may thereby be completely demonstrated.

From this identity some have conceived hopes of depriving the clouds of all their thunder, and thereby rendering thunder-storms harmless.

18. Mr. Stephen Gray, just before he died, hit upon an experiment which seemed to indicate, that the attractive power, which regulates the motions of the heavenly bodies, is of the electric kind. The experiment was thus: he fixed a large, round, iron-ball upon the middle of a large cake of rosin and wax; and exciting the virtue strongly in the cake, a fine feather, suspended by a thread, and held near the iron-ball, was carried round it, by the effluvia, in a circular manner, and performed several revolutions: it moved the same way with the planets, from west to east, and its motion, like theirs, was not quite circular, but a little elliptical.

These being most of the capital experiments hitherto exhibited in electricity, we shall conclude this article by mentioning some of the medicinal virtues lately attributed to this subject of philosophy. It has been pretended, that odours will

will pervade electrified globes and tubes of glass; and that the medicinal effects of drugs might likewise be transmitted this way; as also, that, if persons were to hold in their hands, or place under their naked feet, odoriferous or purging substances, and were then to be electrized, they would be sensible of the effects of these substances: but this seems now to be an imposition on the credulity of the world, no such effects having ever been perceived. However, it does not follow that medicinal advantages are not to be gained from electricity itself; so subtle and so elastic a fluid admitted in a large quantity into our bodies, as, from undoubted experience, it greatly heats the flesh and quickens the pulse, may more especially, when assisted with the expectation of success in the patient, in particular cases, be attended with advantages. In effect, we meet with some cures performed in paralytic cases, by the force of electricity.

**ELECTRUM**, *amber*, in natural history. See the article **AMBER**.

**ELECTUARY**, in pharmacy, a form in which both officinal and extemporaneous medicines are frequently made.

It may be considered as a number of boluses united together, but is made somewhat softer, by an addition of a due proportion of preserves or syrups. When the consistence is very soft, it is called, sometimes, by the name of opiata. See the articles **BOLUS** and **OPATA**.

The principal consideration in prescribing officinal electuaries is, that such things only be put together, as will not, by any opposite qualities, destroy one another, or lose their natural properties, by lying long in this manner; and likewise that the whole be of a consistence that will hold ingredients of different gravities in equal mixture.

Extemporaneous electuaries differ principally from the officinal, in that the latter are confined to such things as will for a long time keep together; whereas the former may be ventured on with materials which will not remain long without change, provided they agree in intention; as conserves with the testaceous powders, preparations with steel, and the like, will continue together long enough for present use, but will not lie many days without fermenting and spoiling.

The stronger cathartics ought not to be trusted in this form, because the manner of taking does not sufficiently ascertain

the dose. The most powerful alexipharmics also, which are commonly given in acute cases, are not conveniently thus trusted, so that an electuary is hardly ever met with in a fever. The quantity of an extemporaneous electuary should seldom exceed three ounces; and thereabout will an ounce and a half of conserve, two drams of the common powders, with a sufficient quantity of syrup, amount to; though cinnabar, and some of the heavier things, will not take up so much: and if this rule, as to quantity, be not observed by the prescriber, but more be ordered, it is a common thing for the compounder to do it for him, by proportioning the materials suitable thereto, as by making up half or a third of what is directed.

**ELEEMOSYNÆ** and **ELEEMOSYNARIUS**. See **ALMS** and **ALMONER**.

**ELEGANCE**, or **ELEGANCY**, an ornament of politeness and agreeableness, shewn in any discourse, with such a choice of rich and happy expressions, as to rise politely above the common manners, so as to strike people of a delicate taste, and diffuse a relish which hits every body.

It is observed that elegance, though irregular, is preferable to regularity without elegance: that is, by being so scrupulous of grammatical construction, we lose certain licences wherein the elegance of language consists.

**ELEGANCE**, in painting, a certain manner which embellishes and heightens objects, either as to their form, colour, or both, without destroying or perverting the truth. It is not seen in the correctness of the design, as appears from Raphael, and the antique. It is most sensibly perceived in works otherwise careless and inaccurate, as in Corregio, where, notwithstanding all the defects as to justness of design, there is an elegance even in the manner of the design itself, as well as in the turn of the attitudes, &c.

**ELEGIAC**, in antient poetry, any thing belonging to elegy. See **ELEGY**.

Elegiac verses are alternately hexameter and pentameter, as in the following verses of Ovid. See the articles **HEXAMETER** and **PENTAMETER**.

*Flebilis indignos, elegeia, solve capillos:*

*Ab nimis ex vero nunc tibi nomen erit.*

Sometimes, though very rarely, the pentameter preceded the hexameter, as in the following verses of Athenæus.

Ἑνδαιμὼν Χαρίτων, καὶ Μελανίππῳ ἐφύ  
Θείας ἀγιστρὲς ἐφεμερίους φιλοτῆτος.

Who

Who was the inventor of elegiac poetry, is not known. Horace professes himself quite ignorant of it. The principal writers of elegiac verse, among the Latins, were Propertius, Ovid, and Tibullus, the latter whereof Quintilian esteems the best elegiac poet; but Pliny the younger gives the preference to the first: the chief writers of elegy among the Greeks were Callimachus, Parthenius, and Euphorion.

**ELEGIT**, in law, a writ of execution, which lies for a person who has recovered debt or damages; or upon a recognizance in any court, against a defendant that is not able to satisfy the same in his goods.

It is directed to the sheriff, commanding him to make delivery of a moiety of the party's lands, and all his goods, beasts of the plough excepted; this is done by a jury, summoned to enquire what land the defendant had at the time of the judgment obtained; and the creditor, by virtue thereof, shall hold the said moiety of land delivered to him, until his whole debt and damages are paid and satisfied: and during that time he is tenant by elegit. This writ ought to be sued out within a year and a day after the judgment.

All other writs of execution may be good, though not returned, except it be an elegit; but that must be returned when executed, because an execution is taken upon it, and that the court may judge of the sufficiency thereof.

**ELEGY**, a mournful and plaintive kind of poem. See the article **ELEGIAC**.

As elegy, at its first institution, was intended for tears, it expressed no other sentiments, it breathed no other accents but those of sorrow: with the negligence natural to affliction, it sought less to please than to move; and aimed at exciting pity, not admiration. By degrees, however, elegy degenerated from its original intention, and was employed upon all sorts of subjects, gay or sad, and especially upon love. Ovid's book *Of Love*, the poems of Tibullus and Propertius, notwithstanding they are termed elegies, are sometimes so far from being sad, that they are scarce serious. The chief subjects then to which elegy owes its rise, is death and love: that elegy therefore ought to be esteemed the most perfect in its kind which has somewhat of both at once; such, for instance, where the poet bewails the death of some youth or damsel falling a martyr to love.

**ELEMENT**, in phyiology, a term used by philosophers to denote the original component parts of bodies, or those into which they are ultimately resolvable.

The elements or principles to which all bodies may be ultimately reduced, are these five: 1. Water, or phlegm, which, in the chemical analysis of them, rises first in form of vapour. 2. Air, which escapes unseen in great quantities from all bodies, so as to constitute half the substance of some of them. 3. Oil, which rises after, and appears swimming on the surface of the water. 4. Salt, which is either volatile, or rises in the still, as that of animal substances; or fixed, as that of vegetables, which is obtained by reducing them to ashes, making a lixivium or lye of these, and afterwards evaporating the moisture; by which means the salt shoots into crystals. 5. Earth, or what is called the *caput mortuum*, being what remains of the ashes after the salt is extracted. This is the last element of all bodies, which can be no farther altered by any art whatsoever. See the articles **WATER**, **AIR**, &c.

The elements of Aristotle were four, earth, water, air, and fire. The cartesians admit only three elements, the first a *materia subtilis*, or fine dust; the second, a coarser, but round kind; and the third, a still more irregular and hooked kind of particles. See the article **CARTESIAN**, &c.

For the doctrine of elements, as delivered by sir Isaac Newton, see the article **NEWTONIAN PHILOSOPHY**.

**ELEMENT**, in a figurative sense, is used for the principles and foundations of any art or science, as Euclid's *Elements*, &c.

**ELEMI**, or **ELEMY**, in the *materia medica*, a kind of resin, very improperly called gum-elemi. There are two sorts of it kept in the shops, the one genuine, and brought from Ethiopia; the other spurious, and the produce of America. The true kind is a yellowish resin, with a cast of green and white; its smell is acrid and pleasant, and its taste acrid and bitter. It is very inflammable, and readily dissolves in oil, and other fat substances, over the fire; which two characters alone sufficiently distinguish it from the gums: but this genuine elemi is very rare in Europe.

The spurious elemi is a whitish resin, produced from a tall tree, with pinnated leaves, not unlike those of the pear-tree.



Fig. 1. The ELEPHANT.

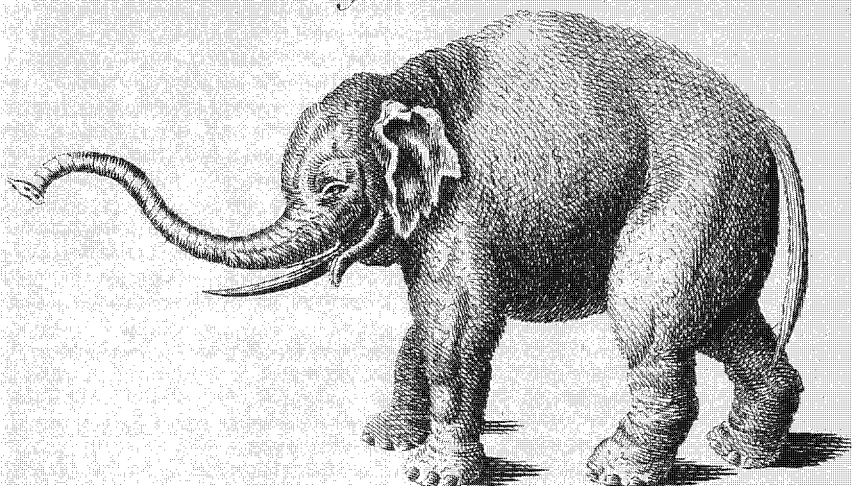


Fig. 2. The ELK.



Fig. 3. EPICYCLOID.

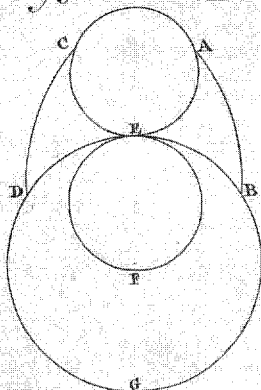


Fig. 4. ERMIN.

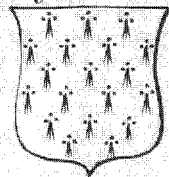
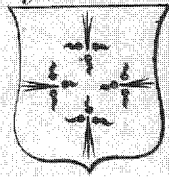


Fig. 5. ERMIN.





It is in some degree pellucid, and of a fragrant smell. It is only used externally, being greatly recommended for resolving tumours, deterring ulcers, wounds, &c.

**ELENCHUS**, in logic, a sophism, or fallacious argument, which deceives the hearer under the appearance of truth. See the article **SOPHISM**.

**ELEOSACCHARUM**, or **ELÆOSACCHARUM**. See **ELÆOSACCHARUM**.

**ELEPHANT**, *elephas*, in zoology, a genus of quadrupeds, of the order of the jumenta, the characters of which, according to Linnæus, are these: it has no fore-teeth; the upper canine, or dog-teeth, are considerably long; it has a very long flexible proboscis or trunk, and two paps placed on the breast. See plate **LXXXVIII. fig. 1.**

The teeth of this animal is what we call ivory. See the article **IVORY**.

The elephant, of which there is only one known species, is, when full grown, from seventeen to twenty feet high; and its body is withal so enormously bulky, that the belly reaches nearer the ground than could easily be conceived of a creature of its height. The trunk is, properly speaking, nothing but the nose continued to a great length; its substance is fleshy, but firm, being composed of three series or orders of fibres: this trunk the creature can contract or protrude forward with great violence, from the length of one foot to five or more.

**ELEPHANT'S TRUNK**, an east-indian species of acus, or needle-fish. See **ACUS**.

**Knights of the ELEPHANT**, an order of knighthood in Denmark, conferred upon none but persons of the first quality and merit. It is also called the order of St. Mary. Its institution is said to have been owing to a gentleman among the danish croisées having killed an elephant, in an expedition against the Sarracens, in 1184. in memory of which king Canutus instituted this order, the badge of which is a towered elephant, with an image of the holy virgin encircled with rays, and hung on a watered sky-coloured ribbon, like the George in England.

**ELEPHANTIASIS**, *elephantiasis*, called also the lepra of the Arabians, in medicine, a chronic disease, one of the two species of leprosy, which affects the whole body, where even the bones as well as the skin are covered with spots and tumours, which being red, at last turn black. See the article **LEPROSY**.

In this disease the body falls away, while the legs and feet are enormously swelled. When the disease is inveterate, the fingers and toes are hid in the tumour, and a slight fever arising, carries the patient off.

Lucretius supposed this disease to be generated in Egypt, and no where else; but if the leprosy of the Jews is the same with that of the negroes, which is highly probable, then it may be affirmed that it is endemic to the southern and inland parts of Africa.

**ELEPHANTINE**, in roman antiquity, an appellation given to the books wherein were registered the transactions of the senate and magistrates of Rome, of the emperors or generals of armies, and even of the provincial magistrates; the births and classes of the people, and other things relating to the census.

They are supposed to have been so called as being made of ivory; though some will have them to have been written on the intestines of elephants.

**ELEPHANTOPUS**, **BASTARD-SCABIOUS**, in botany, a genus of the *Jyngetia-polygamia-aqualis* class of plants, the compound flower of which is tubulose, consisting of four or five hermaphrodite and ligulated corollulæ, with a narrow limb, divided into five nearly equal segments: the stamina are five very short filaments: the seeds are solitary, and contained in the cup, being of a compressed figure, and crowned with bristly hairs.

**ELEPHAS**, the **ELEPHANT**, in zoology. See the article **ELEPHANT**.

**ELEVATION**, *elevatio*, the same with altitude or height. See **ALTITUDE**.

*Angle of ELEVATION*, in gunnery, that comprehended between the horizon and the line of direction of a cannon or mortar; or it is that which the chafe of a piece, or the axis of its hollow cylinder, makes with the plane of the horizon.

**ELEVATION**, in architecture, the same with an orthographic, or upright draught of a building. See **ORTHOGRAPHY**.

*ELEVATION of the host*, in the church of Rome, that part of the mass where the priest raises the host above his head for the people to adore. See the articles **MASS** and **HOST**.

**ELEVATOR**, in anatomy, the name of several muscles, so called from their serving to raise the parts of the body to which they belong: such are the elevator alæ nasæ, the elevator of the auricle

or external ear, the elevator of the epiglottis, of the eye-lids, humerus, lips, urethra, and those of the anus, called also levatores. See **MUSCLE**.

The elevator of the eye-lids is also called superbus, as being used when people put on a haughty or high look.

**ELEVATORY**, *elevatorium*, in surgery, an instrument for raising depressed or fractured parts of the skull, to be applied after the integuments and periosteum are removed. If there is any hole, the instrument must be fastened to it; but if there is none, the screw-end of the instrument must be applied. See plate LXXXV. fig. 3. n° 1.

But as these elevatories are so contrived, that, where the neighbouring bones are fractured or depressed, they cannot be applied without greatly increasing the pain, surgeons have invented another kind which might be applied with more safety, called *tripes*, from the number of its feet. It is near twice as big as the figure we have given of it; (*ibid.* n°. 2.) and the feet A A A stand nearer or farther from each other, as there is occasion. The manner of applying it is this: the feet are to be applied to the sound parts of the head, and the screw B C, by frequently turning its handle D D, will presently lay hold of the depressed part of the cranium, especially if a small hole has been made in it with the point of a sharp awl. Then upon turning the screw, E E, the trepan is raised by degrees, and with it the depressed part of the cranium. But if any opening shall appear between the fractured parts, it will be proper to take off the pointed end of the instrument B, and in its room fix the elevatory G, by the screw H, about the part F of the figure n° 2. by the assistance of which it will be easy to raise the depressed part. See the manner of applying this instrument represented *ibid.* n° 3.

**ELEVE**, a french term, sometimes met with in our language, signifying a disciple.

Formerly there were twenty eleves in the academy of sciences at Paris, and ten in that of inscriptions; but the term has since been changed for adjunct. See the articles **ACADEMY** and **ADJUNCT**.

**ELEUSINIA**, in grecian antiquity, a festival kept in honour of Ceres, every fourth, by some states, but by others, every fifth year. The Athenians celebrated it at Eleusis, a town of Attica, whence the name.

It was celebrated with a world of ceremony, and persons of both sexes were initiated in it; it being deemed impious to neglect doing so. The mysteries were of two sorts, the lesser, and the greater; whereof the former were sacred to Proserpine, Ceres's daughter, and the latter to Ceres herself. According to Lactantius, they consisted in a mystical representation of what mythologists teach of Ceres; though some of the christian fathers will have the great mystery, or secret, which they were forbidden by law, upon pain of death, to divulge, to have been the representation or figures of both male and female privities, which were handed about and exposed to the company.

**ELEUTHERIA**, another festival celebrated at Plataea, by delegates from almost all the cities of Greece, in honour of Jupiter Eleutherius, or the assessor of liberty.

It was instituted in memory of the victory obtained by the Grecians, in the territories of Plataea, over Mardonius, the persian general, left by Xerxes with a mighty army to subdue Greece.

**ELF**, a term, now almost obsolete, formerly used to denote a fairy, or hobgoblin, an imaginary being, the creature of ignorance, superstition, and craft. See the article **FAIRY**.

**ELF-ARROWS**, in natural history, a name given to the flints, antiently fashioned into arrow-heads, and still found fossil in Scotland, America, and several other parts of the world.

**ELFIELD**, or **EIFFIELD**. See **EIFFIELD**.

**ELGIN**, the capital of the county of Murray, in Scotland, situated on the river Lossy, about six miles north of the Spey: west long. 2° 25', north lat. 57° 40'.

**ELICHRYSUM**, or **HELICHRYSUM**, in botany, a species of gnaphalium. See the article **GNAPHALIUM**.

**ELICIT**, in ethics, is applied to an act of the will immediately produced by, and of, the will, and received within the same: as to be willing, unwilling, loving, hating, &c. Acts of which nature are termed elicited, because that, being before in the power of the will, they are now brought forth into act. But they are so far intrinsic, that some authors consider them as the will itself, and deny that they ought to be distinguished from it any more than light is to be distinguished from the sun. *Chauvin.*

**ELI-**

**ELIGENDO VIRIDARIO.** See the article **VIRIDARIO ELIGENDO.**

**ELIGIBILITY**, in the romish canon law, a bull granted by the pope, to certain persons to qualify them to be chosen to an office, or dignity, whereof they were before incapable by want of age, birth, or the like.

**ELIQUATION**, in metallurgy, a separation of the different parts of mixed bodies, by the different degrees of fire required to melt them.

When the nature of ores, or of metallic mixtures, is such, that while one part of them melts in the fire, the other, more refractory and difficult of fusion, remains still solid; the first, when the mass is placed in a mild fire, flows out of the interstices of the other, and is thus separated from it. The perfection of this operation requires a different fluidity of the parts that constitute the mass. Lead, for instance, melts into one mass with copper, by a strong fire, whereas these metals cannot dissolve each other in a moderate one, but if the mass composed of both these, thus blended together, is afterwards exposed to a mild fire on an inclined plane, the lead alone melts, the copper becoming only brittle and spongy, and remaining in its solid form, even when the lead has run out of it. This separation, however, is not so perfectly made, but that there ever remains some lead in the copper, and some small part of the copper is also carried away with the lead: wherefore it is necessary, for this experiment, that the metals are not mixed in too minute proportions; for if one thousandth part of lead were to be mixed with copper, or the same small proportion of copper with the lead, the separation by eliquation could not be effected.

It is generally necessary also, to make this operation succeed, to add ingredients that are capable either of destroying the force by which the different parts cohere together, or of procuring an easier flux of the metals: for the mixture of the other metals will not be separated like those of copper and lead, without the admixture of other substances. For instance, gold, silver, and copper melted together, and perfectly blended by that means with one another, remain in the same state in any degree of fire; to make the eliquation of the gold and silver, therefore, out of such a mixture, the

same additions must be used as in the operation of precipitation by fusion.

**ELIRE**, or **CONGE D'ELIRE.** See the article **CONGE.**

**ELISIUM**, or **ELYSIUM.** See **ELYSIUM.**

**ELISION**, in grammar, the cutting off, or suppressing a vowel at the end of a word, for the sake of sound, or measure, the next word beginning with a vowel. Elisions are pretty frequently met with in english poetry, but more frequently in the Latin, French, &c. They chiefly consist in suppressions of the *a*, *e*, and *i*, though an elision suppresses any of the other vowels: In the following example from Virgil there are three elisions.

*Philida amo ante alias* ----

**ELIXATION**, in pharmacy, the extracting the virtues of ingredients by boiling or stewing. See **DECOCTION.**

**ELIXIR**, in medicine, a compound tincture extracted from many efficacious ingredients. Hence the difference between a tincture and an elixir seems to be this, that a tincture is drawn from one ingredient, sometimes with an addition of another to open it, and to dispose it to yield to the menstruum; whereas an elixir is a tincture extracted from several ingredients at the same time. See the article **TINCTURE.**

There are a great number of elixirs described by chemical writers, and in the dispensaries, the most remarkable of which are prepared as follows.

**ELIXIR of aloe.** Take of the tincture of myrrh a quart; saffron, soccotrine aloe, of each three ounces. After digestion, strain off the spirit.

*The paregoric* **ELIXIR.** Take flowers of benjamin, and opium, strained, of each a dram; of camphor, two scruples; of the essential oil of anniseeds half a dram, or rectified spirit of wine a quart. After digestion, strain off the spirit.

*Acid* **ELIXIR of vitriol.** Take of the aromatic tincture a pint; of the strong spirit, or oil of vitriol the weight of four ounces; mix them gradually, and when the fæces are subsided, filtre thro' paper.

*Dulcified* **ELIXIR of vitriol.** Take of aromatic tincture a pint; of dulcified spirit of vitriol, eight ounces in weight; mix them. This preparation is intended, for stomachs which cannot bear the acidity of the preceding.

*The compound* **ELIXIR of myrrh.** Take of the extract of savine, one ounce; of the tincture of castor, a pint; of the tincture

of myrrh, half a pint. After digestion, strain off the liquor.

**ELIXIS**, in pharmacy, a name formerly used for a linctus. See **LINCTUS**.

**ELK**, *alce*, in zoology, an animal of the deer-kind, with the horns palmated, and without a stem. It is a native of the northern parts of Europe, and is a very large and strong animal; being equal in size to a horse, but much less beautiful. See plate **LXXXVIII.** fig. 2.

Elk's hoofs stand recommended for the cure of the epilepsy, but at present are only used as an ingredient in some old compositions.

**ELKHOLM**, a port-town of Gothland, in Sweden, twenty-four miles west of Carelsroon.

**ELL**, *ulaa*, a measure of length, different in different countries; but those mostly used in England, are the english and Flemish ells; whereof the former is three feet nine inches, or one yard and a quarter; and the latter only twenty-seven inches, or three quarters of a yard. In Scotland, the ell contains  $37\frac{2}{3}$  english inches. See **MEASURE**.

**ELLERENA**, a town of Estremadura, in Spain, fifty miles south-east of Merida.

**ELLIPSIS**, in geometry, a curve line returning into itself, and produced from the section of a cone by a plane cutting both its sides, but not parallel to the base. See **CONIC SECTIONS**.

The easiest way of describing this curve, in plano, when the transverse and conjugate axes **AB**, **ED**, (plate **LXXXVII.** fig. 3. n<sup>o</sup> 1.) are given, is thus: First take the points **F**, **f**, in the transverse axis **AB**, so that the distances **CF**, **Cf**, from the center **C**, be each equal to  $\sqrt{AC-CD}$ ; or, that the lines **FD**, **fD**, be each equal to **AC**. Then, having fixed two pins in the points **F**, **f**, which are called the foci of the ellipsis, take a thread equal in length to the transverse axis **AB**; and fastening its two ends, one to the pin **F**, and the other to **f**, with another pin **M** stretch the thread tight: then if this pin **M** be moved round till it returns to the place from whence it first set out, keeping the thread always extended so as to form the triangle **FMf**, it will describe an ellipsis, whose axes are, **AB**, **DE**.

The greater axis, **AB**, passing through the two foci **Ff**, is called the transverse axis; and the lesser one **DE**, is called the conjugate, or second axis: these two always bisect each other at right angles,

and the center of the ellipsis is the point **C**, where they intersect. Any right line passing through the center, and terminated by the curve of the ellipsis on each side, is called a diameter; and two diameters, which mutually bisect all the parallels to each other, bounded by the ellipsis, are called conjugate diameters. Any right line, not passing through the center, but terminated by the ellipsis, and bisected by a diameter, is called the ordinate, or ordinate-applicate, to that diameter. And a third proportional to two conjugate diameters, is called the latus rectum, or parameter of that diameter which is the first of the three proportionals.

The reason of the name is this: let **BA**, **ED**, be any two conjugate diameters of an ellipsis (see plate **LXXXVII.** fig. 3. n<sup>o</sup> 2. where they are the two axes) at the end **A**, of the diameter **AB**, raise the perpendicular **AF**, equal to the latus rectum, or parameter, being a third proportional to **AB**, **ED**, and draw the right line **BE**: then if any point **P** be taken in **BA**, and an ordinate **PM** be drawn, cutting **BE** in **N**, the rectangle under the absciss **AP**, and the line **PN** will be equal to the square of the ordinate **PM**. Hence drawing **NO** parallel to **AB**, it appears that this rectangle, or the square of the ordinate, is less than that under the absciss **AP**, and the parameter **AF**, by the rectangle under **AP** and **OF**, or **NO** and **OF**; on account of which deficiency, Apollonius first gave this curve the name of an ellipsis, from ελλειπειν, to be deficient. In every ellipsis, as **AEBD**, (*ibid.* n<sup>o</sup> 2.) the squares of the semi-ordinates **MP**, **mp**, are as the rectangles under the segments of the transverse axis **AP**  $\times$  **PB**, **Ap**  $\times$  **pB**, made by these ordinates respectively; which holds equally true of the circle, where the squares of the ordinates are equal to such rectangles, as being mean proportionals between the segments of the diameter. In the same manner, the ordinates to any diameter whatever, are as the rectangles under the segments of that diameter.

As to the other principal properties of the ellipsis, they may be reduced to the following propositions. 1. If from any point **M** in an ellipsis, two right lines, **MF**, **Mf**, (*ibid.* n<sup>o</sup> 1.) be drawn to the foci **F**, **f**, the sum of these two lines will be equal to the transverse axis **AB**. This is evident from the manner of describing an ellipsis.

ellipſis. 2. The ſquare of half the leſſer axis is equal to the rectangle under the ſegments of the greater axis, contained between the foci and its vertices; that is,  $DC^2 = AF \times FB = Af + fB$ . 3. Every diameter is biſected in the center C. 4. The tranſverſe axis is the greateſt, and the conjugate axis the leaſt, of all diameters. 5. Two diameters, one of which is parallel to the tangent in the vertex of the other, are conjugate diameters; and vice verſa, a right line drawn thro' the vertex of any diameter parallel to its conjugate diameter, touches the ellipſis in that vertex. 6. If four tangents be drawn through the vertices of two conjugate diameters, the parallelogram contained under them will be equal to the parallelogram contained under tangents drawn through the vertices of any other two conjugate diameters. 7. If a right line, touching an ellipſis, meet two conjugate diameters produced, the rectangle under the ſegments of the tangent, between the point of contact and theſe diameters, will be equal to the ſquare of the ſemi-diameter, which is conjugate to that paſſing thro' the point of contact. 8. In every ellipſis, the ſum of the ſquares of any two conjugate diameters, is equal to the ſum of the ſquares of the two axes. 9. In every ellipſis, the angles FGI, fGH, (*ibid.* n<sup>o</sup> 1.) made by the tangent HI, and the lines FG, fG, drawn from the foci to the point of contact, are equal to each other. 10. The area of an ellipſis is to the area of a circumscribed circle, as the leſſer axis is to the greater, and vice verſa, with reſpect to an inſcribed circle; ſo that it is a mean proportional between two circles, having the tranſverſe and conjugate axes for their diameters. This holds equally true of all the other correſponding parts belonging to an ellipſis.

The curve of any ellipſis may be obtained by the following ſeries. Suppoſe the ſemi-tranſverſe axis  $CB = r$ , the ſemi-conjugate axis  $CD = c$ , and the ſemi-ordinate  $= a$ ; then the length of the curve

$$MB = a + \frac{r^2 a^3}{6c^4} + \frac{4r^2 c^2 a^5 - r a^5}{40c^6} + \frac{8c^4 r^2 a^7 + r^6 a^7 - 4c^2 r^5 a^7}{112c^{12}}, \&c. \text{ And,}$$

if the ſpecies of the ellipſis be determined, this ſeries will be more ſimple: for if

$$c = 2r, \text{ then } MB = a + \frac{a^3}{96r^2} + \frac{3a^5}{2048r^4} + \frac{113a^7}{458752a^6} + \frac{3419a^9}{75497472r^8}, \&c. \text{ This}$$

ſeries will ſerve for an hyperbola, by making the even parts of all the terms affirmative, and the third, fifth, ſeventh, &c. terms negative.

The periphery of an ellipſis, according to Mr. Simpson, is to that of a circle, whoſe diameter is equal to the tranſverſe

$$\text{axis of the ellipſis, as } 1 - \frac{d}{2.2} - \frac{3d^2}{2.2.4.4} - \frac{3.3.5d^3}{2.2.4.4.6.6} - \frac{2.3.5.5.7d^4}{2.2.4.4.6.6.8.8}, \&c.$$

is to 1, where  $d$  is equal to the difference of the ſquares of the axes applied to the ſquare of the tranſverſe axis.

Thoſe who deſire to be more particularly informed concerning the properties of the ellipſis may conſult Simſon's Conic Sections, and Woliſius's Elements of Mathematics, tom. 1. alſo Maclaurin's Fluxions, Art. 609. ſeq. and the marquis de l'Hopital's Sect. Conic. lib. 6.

*Infinite ELLIPSIS.* See ELLIPTOIDES.

*Quadrature of the ELLIPSIS.* See the article QUADRATURE.

ELLIPSIS, in grammar, a figure of ſyntax, wherein one or more words are not expreſſed; and from this deficiency, it has got the name ellipſis.

To this figure, beſides the ellipſis properly ſo called, belong appoſition, ſynecdoche, aſyndeton, zeugma, ſyllepiſis, and prolepiſis. See the articles APPPOSITION, SYNECDOCHE, &c.

The ellipſis, properly ſo called, is when the deficient word or words muſt be ſupplied from elſewhere; as *Hectoris Andromache*, where *uxor* is underſtood; that is, Andromache Hector's wife.

ELLIPSIS, in rhetoric, a figure nearly allied to preterition, when the orator, through tranſport of paſſion, paſſes over many things; which, had he been cool, ought to have been mentioned.

In preterition, the omiſſion is deſigned; which, in the ellipſis, is owing to the vehemence of the ſpeaker's paſſion, and his tongue not being able to keep pace with the emotion of his mind.

ELLIPTIC, or ELLIPTICAL, ſomething belonging to an ellipſis. See ELLIPSIS. Thus we meet with elliptical compaſſes, elliptic conoid, elliptic ſpace, elliptic ſtairs, &c. See the articles COMPASSES, CONOID, &c.

The elliptic ſpace is the area contained within the curve of the ellipſis, which is to that of a circle deſcribed on the tranſverſe axis, as the conjugate diameter is to the tranſverſe axis; or it is a mean

proportional between two circles, described on the conjugate and transverse axis.

**ELLIPOMACROSTYLA**, in natural history, a genus of imperfect crystals, with single pyramids; one end of their column being affixed to some solid body. They are dodecahedral, with thinner hexangular columns, and hexangular pyramids. See the article **CRYSTAL**.

Of these crystals authors enumerate a great many species; among which are the whitish pellucid sprig crystal, a bright brown kind, a dull brown kind, and a bright yellow kind, all which are farther distinguished according to the different lengths of their pyramids.

**ELLIPOPACHYSTYLA**, in natural history, a genus of imperfect crystals, composed of twelve planes, in an hexangular column, terminated by an hexangular pyramid at one end, and irregularly affixed to some other body at the other, with shorter columns. See the article **CRYSTAL**.

There are two species of these crystals, one short, bright and colourless, found in great plenty in New Spain, and other parts of America; the other a short, dull, and dusky brown one, found in Germany and sometimes in England.

**ELLIPTOIDES**, in geometry, a name used by some to denote infinite ellipses, defined by the equation  $ay^{m+n} = bx^m$  ( $a-x$ )<sup>n</sup>.

Of these there are several sorts: thus, if  $ay^3 = bx^2$  ( $a-x$ ) it is a cubical ellipsoid; and if  $ay^4 = bx^2$  ( $a-x$ )<sup>2</sup>, it denotes a biquadratic ellipsoid, which is an ellipsis of the third order in respect of the apollonian ellipsis.

**ELM**, *ulmus*, in botany. See the article **ULMUS**.

The elm is very serviceable in places where it may lie continually dry, or wet in extremes. Accordingly, it is proper for water-works, mills, the ladders and soles of the wheel-pipes, pumps, aqueducts, pales, and ship-planks beneath the water-lines. It is also of use for wheelwrights, handles for single saws, axletrees, and the like. The clearness of the grain, makes it also fit for all kinds of carved works, and most ornaments relating to architecture. As to the medicinal uses of elm, the leaves are astringent, and the bark good for assuaging the pains of the gout.

**ELNA**, a town of Catalonia in Spain, but subject to France, situated ten miles south of Perpignan.

**ELOCUTION**, in rhetoric, the adapting words and sentences to the things or sentiments to be expressed. It consists of elegance, composition, and dignity. The first, comprehending the purity and perspicuity of a language, is the foundation of elocution. The second ranges the words in proper order; and the last adds the ornaments of tropes and figures to give strength and dignity to the whole. See **STYLE**, **PERIOD**, **FIGURE**.

**ELODES**, in botany, a species of hypericum. See the article **HYPERICUM**.

**ELOGY**, *elogium*, a praise or panegyric bestowed on any person or thing, in consideration of its merit. The beauty of elogy consists in an expressive brevity. Elogiums should not have so much as one epithet properly so called, nor two words synonymous. They should strictly adhere to truth; for extravagant and improbable elogies rather lessen the character of the person or thing they would extol.

**ELOINED**, in law, signifies restrained or hindered from doing something: thus it is said, that if those within age be eloined, so that they cannot sue personally, their next friends shall sue for them.

**ELONGATION**, in astronomy, the digression or recess of a planet from the sun, with respect to an eye placed on our earth. The term is chiefly used in speaking of Venus and Mercury, the arch of a great circle intercepted between either of these planets and the sun, being called the elongation of that planet from the sun.

But here it is to be observed, that it is only a circle which has the sun for its center; that the greatest elongation is in a line touching the planet's orbit. For in an elliptic orbit it may be, that the elongation from the sun may grow still greater, even after it has left the place where the line joining the earth and planet touches its orbit. For after that, the true distance of the planet from the sun may increase, whilst the distance of the sun and planet from the earth does not increase, but rather decrease. But because, the orbits of the planets are nearly circular, such small differences may be neglected in astronomy. The greatest elongation of Venus is found by observation to be about forty-eight degrees

degrees, and the greatest elongation of Mercury about twenty-eight degrees, upon which account this planet is rarely to be seen with the naked eye. See the articles **PLANET**, **VENUS**, **MERCURY**, &c.

**ELONGATION** is also used for the difference in motion between the swiftest and the slowest of two planets, or the quantity of space whereby the one has overgone the other.

*Angle of ELONGATION* is an angle contained under lines drawn from the center of the sun and planet to the center of the earth.

**ELONGATION**, in surgery, is an imperfect luxation, occasioned by the stretching or lengthening of the ligaments of any joint. See the article **LUXATION**.

**ELOPEMENT**, in law, is where a married woman departs from her husband, and cohabits with an adulterer; in which case the husband is not obliged to allow her any alimony out of his estate, nor is he chargeable for necessaries for her of any kind. However, the bare advertising a wife in the Gazette, or other public papers, is not a legal notice to persons in general not to trust her; tho' a personal notice given by the husband to particular persons, is said to be good.

An action lies, and large damages may be recovered, against a person for carrying away and detaining another man's wife.

**ELOQUENCE**, the art of speaking well, so as to affect and persuade.

Cicero defines it, the art of speaking with copiousness and embellishment.

Eloquence and rhetoric differ from each other, as the theory from the practice; rhetoric being the art which describes the rules of eloquence, and eloquence that art which uses them to advantage. For the most part, however, they are used indiscriminately for each other. See the articles **RHETORIC**, **ORATORY**, **INVENTION**, **DISPOSITION**, **EXPRESSION**, **PRONUNCIATION**, **ACTION**, &c.

**ELSIMBURG**, a port-town of Sweden, about seven miles east of Elsinore.

**ELSINORE**, a port-town of Denmark, about twenty-two miles north of Copenhagen, and situated on the Sound, or the entrance into the Baltic sea.

**ELTZ**, a town of lower Saxony, about eleven miles south-west of Hildesheim.

**ELVAS**, a city and bishop's see of Alentejo, in Portugal, situated near the frontiers of Spanish Estremadura: west long.  $7^{\circ} 35'$ , and north lat.  $38^{\circ} 45'$ .

It is one of the strongest fortresses in Portugal.

**ELVELA**, in botany, a genus of funguses smooth both on the upper and under side. Micheli calls this genus fungoides and fungoidaster.

**ELUL**, in antient chronology, the twelfth month of the Jewish civil year, and the sixth of the ecclesiastical: it consisted of only twenty-nine days, and answered pretty nearly to our August.

**ELUTRIATION**, in metallurgy, the separating the lighter matters from the mixt ores of metals, by means of great quantities of fair water. Solid bodies not dissoluble in water, are by this operation separated from each other, by water very well stirred, so that the lighter and more subtle parts are carried away by the water, while the heavier and more solid bodies remain at the bottom of the vessels. Some of the stones, earths, and other bodies naturally mixt with the ores of metals, are much lighter than the metalline parts of these ores, and are therefore very easily separated by elutriation, either by barely pounding and washing them, or by previous calcination, and then extinguishing them in water, and washing them.

The kinds of ores proper for elutriation are known, 1. By the heterogeneous matter, and the ores themselves being in such large masses, as to be very visible, and easily broken and separated by hammers, wedges, &c. 2. By the great specific gravity of the ore, which shews us that the metallic masses adhere to their matrix in firm, solid molecules, and are not scattered and dispersed sparingly through it. 3. From the lightness of the stony matrix. And, 4. From its brittleness, whether this property be naturally inherent in the stony matter, or procured by fire in calcination; for in each case it renders the comminution of the compound mass easy. In this case, however, it is necessary that the ore itself be of a nature sufficiently fixed, and that it do not fly off in the roasting, but only melt into solid spheroidal molecules. See Cramer's Art. Docim. pars i. § 381, 535.

**ELY**, a city and bishop's see of Cambridgeshire, situated about twelve miles north of Cambridge: east lon.  $15'$ , and north lat.  $52^{\circ} 24'$ .

It is a county of itself, including the territory around, and has a judge who determines all causes civil and criminal within its limits.

**ELYMUS**,

**ELYMUS**, in botany, a genus of the *triandria-digynia* class of plants, the calyx of which is a common involucre, consisting of four leaves, and containing several flowers in two spiculæ: the particular corollæ are composed of two valves: the seed is oblong.

**ELYSIUM**, or **ELYSIAN FIELDS**, in heathen mythology, certain plains abounding with woods, fountains, verdure, and every delightful object; supposed to be the habitation of heroes and good men, after death.

According to some, the fable of elysium is of phœnician extraction, or rather founded upon the account of paradise delivered in the scriptures. As to the situation of these happy regions, authors are not agreed: Homer makes them the same with certain pleasant meadows near Memphis, on the banks of the acherusian lake, mentioned by Diodorus Siculus in his description of the funerals of the Egyptians. Virgil seems to place them in Italy, only under-ground: and others in other places. But the generality of authors will have them to be situated in the Fortunate Islands. See **FORTUNATE ISLANDS**.

**ELYTROIDES**, or **VAGINALIS**, in anatomy, the second proper membrane that involves the testes. See **TESTICLE**.

**EMANATION**, the act of flowing or proceeding from some source or origin; or, the thing that proceeds from that action.

**EMANATION**, among schoolmen, is used for the production of a lesser thing, in order to the production of a greater, by virtue of some natural connection or dependance between them: for, as when several moveables are joined together, the same power that moves the first, moves all the rest; as in pulling up the trunk of a tree, you pull up the branches, roots, &c. or in drawing one link of a chain, you bring forwards all the rest: the same is to be understood in all conjunct natural effects, *viz.* that the same power whereby the first is produced, does also produce all the rest naturally connected to it, in that, by means of the connection the action of the agent is conveyed from the one to the other, so that the first determines the agent to the production of all the rest; and hence that is called an *emanative cause*, in contradistinction to an efficient cause, which produces an effect by its mere presence, without the intervention of any action.

**EMANCIPATION**, in the roman law, the setting free a son from the subjection

of his father; so that whatever moveables he acquires, belong in propriety to him, and not to his father, as before emancipation.

Emancipation put the son in capacity of managing his own affairs, and of marrying without his father's consent, though a minor. Emancipation differs from manumission, as the latter was the act of a master in favour of a slave, whereas the former was that of a father in favour of his son.

There were two kinds of emancipation, the one tacit, which was by the son's being promoted to some dignity, by his coming of age, or by his marrying, in all which cases he became his own master of course.

The other, express; where the father declared before a judge, that he emancipated his son. In performing this, the father was first to sell his son imaginarily to another, whom they called *pater fiduciarius*, father in trust, of whom being bought back again by the natural father, he manumitted him before the judge, by a verbal declaration. See **MANUMISSION**. Emancipation still obtains in France with regard to minors or pupils, who are hereby set at liberty to manage their own effects, without the advice or direction of their parents or tutors.

**EMARGINATED**, among botanists, an appellation given to such leaves as have a little indenting on their summits: when this indenting is terminated on each side by obtuse points, they are said to be obtusely emarginated; whereas when these points are acute, they are called acutely emarginated.

**EMASCULATION**, the act of castrating or depriving a male of those parts which characterize his sex. See **CASTRATION**.

**EMAUX DE L'ESCU**, in heraldry, the metal and colour of the shield or escutcheon. See the article **SHIELD**.

**EMBALMING** is the opening a dead body, taking out the intestines, and filling the place with odoriferous and desiccative drugs and spices, to prevent its putrifying. The Egyptians excelled all other nations in the art of preserving bodies from corruption; for some that they have embalmed upwards of two thousand years ago, remain whole to this day, and are often brought into other countries as great curiosities. Their manner of embalming was thus: they scooped out the brains with an iron scoop, out at the nostrils, and threw in medicaments to fill up the vacuum:



**vacuum** : they also took out the entrails, and having filled the body with myrrh, cassia, and other spices, except frankincense, proper to dry up the humours, they pickled it in nitre, where it lay soaking for seventy days. The body was then wrapped up in bandages of fine linnen and gums, to make it stick like glue, and so was delivered to the kindred of the deceased, entire in all its features, the very hairs of the eye-lids being preserved. They used to keep the bodies of their ancestors, thus embalmed, in little houses magnificently adorned, and took great pleasure in beholding them, alive as it were, without any change in their size, features, or complexion. The Egyptians also embalmed birds, &c. The prices for embalming were different; the highest was a talent, the next twenty minæ, and so decreasing to a very small matter: but they who had not wherewithal to answer this expence, contented themselves with infusing, by means of a syringe, thro' the fundament, a certain liquor extracted from the cedar, and leaving it there, wrapped up the body in salt of nitre: the oil thus preyed upon the intestines, so that when they took it out, the intestines came away with it, dried, and not in the least putrified: the body being inclosed in nitre, grew dry, and nothing remained besides the skin glued upon the bones.

**EMBARCADERO**, in the spanish, commerce, the port-town of some considerable inland city; such is Arica to Potosi. See the articles **ARICA** and **POTOSI**.

**EMBARGO**, in commerce, an arrest on ships, or merchandize, by public authority; or a prohibition of state, commonly on foreign ships, in time of war, to prevent their going out of port; sometimes to prevent their coming in; and sometimes both, for a limited time.

The king may lay embargoes on ships, or employ those of his subjects, in time of danger, for service and defence of the nation; but they must not be for the private advantage of a particular trader, or company; and therefore a warrant to stay a single ship is no legal embargo. No inference can be made from embargoes which are only in war-time; and are a prohibition by advice of council, and not at prosecution of parties. If goods be laden on board, and after an embargo, or restraint from the prince or state, comes forth, and then the master of the ship breaks ground, or endeavours to sail, if

any damage accrues, he must be responsible for the same; the reason is, because his freight is due, and must be paid, nay though the goods be seized as contraband.

**Embargo** differs from quarantine, inasmuch as this last is always for the term of forty days, in which persons from foreign parts infected with the plague, are not permitted to come on shore. See the article **QUARANTINE**.

**EMBASSADOR**, or **AMBASSADOR**, a public minister sent from one sovereign prince, as a representative of his person, to another.

Embassadors are either ordinary or extraordinary. Embassador in ordinary is he who constantly resides in the court of another prince, to maintain a good understanding, and look to the interest of his master. Till about two hundred years ago, embassadors in ordinary were not heard of; all, till then, were embassadors extraordinary, that is, such as are sent on some particular occasion, and who retire as soon as the affair is dispatched.

By the law of nations, none under the quality of a sovereign prince can send or receive an embassador. At Athens, embassadors mounted the pulpit of the public orators, and there opened their commission, acquainting the people with their errand. At Rome, they were introduced to the senate, and delivered their commissions to them.

Embassadors should never attend any public solemnities, as marriages, funerals, &c. unless their masters have some interest therein: nor must they go into mourning on any occasions of their own, because they represent the persons of their prince. By the civil law, the moveable goods of an embassador, which are accounted an accession to his person, cannot be seized on, neither as a pledge, nor for payment of a debt, nor by order or execution of judgment, nor by the king's or state's leave where he resides, as some conceive; for all actions ought to befar from an embassador, as well that which toucheth his necessities, as his person: if, therefore, he hath contracted any debt, he is to be called upon kindly, and if he refuses, then letters of request are to go to his master. Nor can any of the embassador's domestic servants, that are registered in the secretaries of state's office, be arrested in person or goods: if they are, the process shall be void, and the parties suing out

out and executing it, shall suffer and be liable to such penalties and corporal punishment as the lord chancellor, or either of the chief justices, shall think fit to inflict. Yet ambassadors cannot be defended when they commit any thing against that state, or the person of the prince, with whom they reside; and if they are guilty of treason, felony, &c. or any other crime against the law of nations, they lose the privilege of an ambassador, and may be subject to punishment as private aliens.

**EMBASSY**, the office or function of an ambassador. See the preceding article. The rights of embassies are, in some measure, founded on the law of nature, which authorizes all that is necessary for procuring and maintaining peace and friendship among men. All sacred and profane histories mention the sacred rights of embassies, and are full of instances of wars undertaken for violating them. In the scriptures we read of a war made by king David upon the Ammonites on that account. Cicero says, that the rights of embassies are guarded by all laws both divine and human; wherefore to violate this right, is not only unjust, but impious; and for this reason, if, for instance, whilst ambassadors of any nation are resident with us, war be declared against their sovereigns, they still remain at liberty: thus are ambassadors safe even amidst the arms of contending foes: and in case a banished man is appointed on an embassy to the country from whence he is banished, he may not be detained nor molested there: and, to speak in general, it is an established custom among all the nations of the world, even barbarians themselves, to reverence the characters of ambassadors.

**EMBATTLED**, in heraldry, the same with crenelle. See **CRENELLE**.

**EMBDEN**, a port-town and city of Germany, capital of a county of the same name, now in possession of the king of Prussia; it is situated at the mouth of the river Ems: east long.  $6^{\circ} 45'$ , and north lat.  $53^{\circ} 40'$ .

**EMBER-WEEKS**, or **DAYS**, in the christian church, are certain seasons of the year set apart for the imploring God's blessing, by prayer and fasting, upon the ordinations performed in the church at such times.

These ordination-fasts are observed four times in the year, *viz.* the Wednesday, Friday, and Saturday after the first Sun-

day in lent, after Whit-sunday, after the fourteenth of September, and the thirteenth of December; it being enjoined, by a canon of the church, that deacons and ministers be ordained, or made, only upon the sundays immediately following these ember-fasts.

The ember-weeks were formerly observed in different churches with some variety, but were at last settled as they are now observed, by the council of Placentia, anno 1095. The council of Mentz, convened by Charlemagne, mentions the ember-weeks as a new establishment.

**EMBERIZA**, in ornithology, a genus of birds, the characters of which are, that the beak is of a conic shape, each chap whereof is wholly entire at the point; the upper one gapes a little at the base from the under, which last is inflected, or turned inwards, at the sides.

To this genus belong the green-finch, bunting, yellow-hammer, &c. See the articles **GREEN-FINCH**, **BUNTING**, &c. Besides these, the schomburger of the spanish West-indies seems to claim a place among the emberizas: the upper part of the body is of a bright brown colour, somewhat inclining to orange, and the whole under part is of a pleasant light reddish brown.

**EMBLEM**, *εμβλημα*, a kind of painted enigma, or certain figures painted or cut metaphorically, expressing some action with reflections underneath, which, in some measure, explain the sense of the device, and, at the same time, instruct us in some moral truth, or other matter of knowledge. The emblem is somewhat plainer than the enigma, and the invention is more modern, it being entirely unknown to the antients. P. Bouhours has a long and accurate dissertation upon emblems, wherein he has precisely defined their nature, laid down rules for their composition, and for distinguishing the true from the false.

The Greeks gave this name to inlaid or mosaic work, and even to all kinds of ornaments of vases, garments, &c. and the Latins used emblem in the same sense.

**EMBLEMATICAL**, something belonging to an emblem. See the preceding article.

**EMBLEMENTS**, among lawyers, denote the profits of sown lands; but are sometimes used, more largely, for any products that naturally arise from the ground.

If a tenant for life sow the land, and afterward dies, his executors shall have the emblements,

emblems, and not the person in reversion. The case is otherwise with respect to a tenant for years; for if he sow the land, and his term expires before he has reaped them, the lessor, or he in reversion, is entitled to the emblems. Again, if a person devises sown lands by will, and dies before severance, the devisee shall have the emblems, provided no exception was made of corn.

**EMBOLISMIC**, or **INTERCALARY**, a term used by chronologists in speaking of the additional months and years, which they insert to bring the lunar to the solar year. Since the common lunar year consists of twelve synodic months, or 354 days nearly, and the solar consists of 365 days (throwing away the odd hours and minutes) it is plain that the solar year will exceed the lunar by about 11 days; and consequently in the space of about 33 years the beginning of the lunar year will be carried through all the seasons, and hence it is called the moveable lunar year. This form of the year is used at this time by the Turks and Arabians; and because in three year's time, the solar year exceeds the lunar by 33 days, therefore, to keep the lunar months in the same seasons and times of the solar year, or near it, chronologists added a whole month to the lunar year every third year, and so made it consist of 13 months; this year they called the embolismic year, and the additional month the embolismic, or embolimean, or intercalary month. This form of the year is called the fixed lunar year, and it was used by the Greeks and Romans till the time of Julius Cæsar. See **INTERCALARY**, **YEAR**, &c.

**EMBOLUS**, the moveable part of a pump, or syringe, called also the piston, or sucker. See the article **PISTON**, **PUMP**, **SYRINGE**, &c.

**EMBOSSING**, or **IMBOSSING**, in architecture and sculpture, the forming or fashioning works in relieve, whether cut with a chissel, or otherwise.

Embossing is a kind of sculpture, wherein the figures stick out from the plane whereon it is cut; and according as the figures are more or less prominent, they are said to be in alto, mezzo, or basso relieve; or high, mean, or low relief. See the article **ENCHASING**.

**EMBRACE** *the volt*, in the manege. A horse is said to embrace a volt, when, working upon volts, he makes a good way every time with his fore-legs.

**EMBRACEOR**, among lawyers, a person, who, having received a reward so to do, comes to the bar with one of the parties, and speaks in the case; or privily labours the jury, or stands in court to over-look them, whereby they are awed or put in fear. Actions of this kind will be embracery, whether the jurors give verdict on the side of the party or not. The penalty of this offence is 20*l*. and imprisonment of the party at the discretion of the court: and may be prosecuted either by indictment at common law, as well as by action on the statute. But attorneys and other lawyers are excepted.

**EMBRASURE**, in architecture, the enlargement made of the aperture of a door or window, on the inside of the wall; its use being to give the greater play for the opening of the door, or casement, or to admit the more light. When the wall is very thick, they sometimes make embrasures on the outside.

**EMBRASURE**, in fortification, a hole or aperture in a parapet, through which the cannon are pointed to fire into the moat or field.

Embrasures are generally twelve feet distant from one another, every one of them being from six to seven feet wide without, and about three within: their height above the platform is three feet on that side towards the town, and a foot and a half on the other side towards the field; so that the muzzle may be sunk on occasion, and the piece brought to shoot low.

**EMBROCATION**, in surgery and pharmacy, an external kind of remedy, which consists in an irrigation of the part affected, with some proper liquor, as oils, spirits, &c. by means of a woollen or linnen cloth, or a sponge, dipped in the same.

The use of embrocation is either to attenuate and dislodge something obstructed underneath the skin, to ease pains, or to irritate the part into more warmth and a quicker sense of feeling.

The pumping used in natural baths is properly an embrocation.

**EMBROIDERY**, a work in gold, or silver, or silk-thread, wrought by the needle upon cloth, stuffs, or muslin, into various figures. In embroidering stuffs, the work is performed in a kind of loom, because the more the piece is stretched, the easier it is worked. As to muslin, they spread it upon a pattern ready designed; and sometimes, before it is stretched upon

the pattern, it is starched, to make it more easy to handle. Embroidery on the loom is less tedious than the other, in which while they work flowers, all the threads of the muslin, both lengthwise and breadthwise, must be continually counted; but on the other hand this last is much richer in points, and susceptible of greater variety. Cloths too much milled are scarce susceptible of this ornament, and in effect we seldom see them embroidered. The thinnest muslins are the best for this purpose, and they are embroidered to the greatest perfection in Saxony: in other parts of Europe, however, they embroider very prettily, and especially in France.

There are several kinds of embroidery, as, 1. Embroidery on the stamp, where the figures are raised and rounded, having cotton or parchment put under them to support them. 2. Low embroidery, where the gold and silver lie low upon the sketch, and are stitched with silk of the same colour. 3. Guimped embroidery: this is performed either in gold or silver; they first make a sketch upon the cloth, then put on cut vellum, and afterwards sew on the gold and silver with silk-thread: in this kind of embroidery they often put gold and silver cord, tinsel, and spangles. 4. Embroidery on both sides; that which appears on both sides of the stuff. 5. Plain embroidery, where the figures are flat and even, without cords, spangles, or other ornaments.

**EMBRUN**, or **AMBRUN**, a city of Dauphiny, in France, near the confines of Piedmont: east longit.  $6^{\circ} 6'$ , and north lat.  $44^{\circ} 35'$ .

**EMBRYO**, in physiology, the first rudiments of an animal in the womb, before the several members are distinctly formed; after which period it is denominated a foetus. See the articles **CONCEPTION**, **GENERATION**, and **FOETUS**.

**EMBRYO-PLANT**, the same with *plantula* *feminalis*. See the article **PLANTULA**.

**EMBRYO-SULPHUR**, *embryonatum sulphur*, that united with metals or other mineral substances. See **SULPHUR**.

**EMBRYO-WORMS**, those contained in the bodies of viviparous two-winged flies, in surprising multitudes. See the articles **FLY** and **WORM**.

**EMBRYOTHLASTES**, in midwifery, an instrument contrived for breaking the bones, for the more easy extraction of the foetus, in difficult labours.

**EMBRYOTOMY**, the cutting a foetus to pieces whilst in the womb, practised in cases of necessity, when there is no other way of saving the mother.

**EMBRYULCUS**, a hook for extracting the child, in difficult labours. See plate **LXVIII.** fig. 2. where  $n^{\circ} 1.$  represents the broad steel-hook of Palfynus, for extracting a live-infant without danger, when its head sticks in the vagina. It is necessary to have two of them, that one may be applied to each side of the head.  $N^{\circ} 2.$  is the hook commonly used for extracting dead foetuses. See the article **DELIVERY**.

**EMENDALS**, in the accounts of the Inner-temple society, where so much in *emendals*, at the foot of an account, signifies so much money in the bank, or stock of the house, for repairing losses, and to supply other emergencies.

**EMENDATIO PANIS**, &c. in law. See the article **ASSIZE**.

**EMERALD**, *smaragdus*, in natural history, a genus of precious stones, of a green colour, and next in hardness to the ruby.

Our jewellers distinguish emeralds into two kinds, the oriental and occidental: the emeralds of the East-indies are evidently finer than those of any other part of the world; but our jewelers, seldom meeting with these, call the american emeralds the oriental, and usually sell crystal accidentally tinged with green, under the name of the occidental emerald: these being also the most common, there has grown an opinion among the lapidaries, that the emerald is no harder than the crystal; because what they take to be emeralds, are in general only crystals.

The genuine emerald, in its most perfect state, is, perhaps, the most beautiful of all the gems: it is found of various sizes, but usually small; a great number of them are met with of about the sixteenth part of an inch in diameter, and they are found from this to the size of a walnut. We have accounts of very large sizes among the antients, but they are certainly erroneous, the stones not being emeralds, but jaspers or other green stones: the larger specimens are at present very scarce, and are of considerable value, tho' much more so, when of the East or West-indies. The emerald is of different figures like the diamond and many of the other gems, being sometimes found in a roundish or pebble-like form, but much more frequently in a columnar one, resembling common crystal.

crystal: the pebble-emeralds are always the hardest and brightest, but are seldom found exceeding the size of a pea: the crystalliform ones grow several together, and are often larger: the pebble-kind are found loose in the earths of mountains, and sands of rivers; the columnar are found usually bedded in, or adhering to, a white, opaque, and coarse crystalline mass, and sometimes to the jasper, or the prasius.

The oriental emerald is of the hardness of the sapphire and ruby, and is second only to the diamond in lustre and brightness: the american is of the hardness of the garnet, and the european somewhat softer than that, yet considerably harder than crystal: but the coloured crystals, usually sold under the name of emeralds, has much debased the credit of this gem. It loses its colour in the fire, and becomes undistinguishable from the white sapphire.

The oriental emeralds are very scarce, and at present found only in the kingdom of Cambay; very few of them have of late been imported into Europe, inasmuch that it has been supposed there were no oriental emeralds; but within these ten years, some few have been brought from Cambay into Italy, that greatly excel the american ones. The american, being what our jewelers call oriental emeralds, are found principally about Peru; and the european, are principally from Silesia.

The medicinal virtues ascribed to this stone, are, that it stops hæmorrhages and diarrheas, and sweetens or obtunds the too acrid humours.

*To counterfeit EMERALDS.* Take of natural crystal, four ounces; of red-lead, four ounces; verdegrease, forty-eight grains; crocus martis, prepared with vinegar, eight grains; let the whole be finely pulverized and sifted; put this into a crucible, leaving one inch empty: lute it well, and put it into a potter's furnace, and let it stand there as long as they do their pots. When cold, break the crucible, and you will find a matter of a fine emerald-colour, which, after it is cut and set in gold, will surpass in beauty an oriental emerald.

**EMERGENT YEAR**, in chronology, the same with the *épôcha*, whence any æra, or method of reckoning time, commences: such is that of the creation of the world, of the birth of our Saviour, &c. See the article *ÆPOCHA*.

**EMERSION**, in astronomy, is when any planet that is eclipsed begins to emerge or get out of the shadow of the eclipsing body.

It is also used when a star, before hid by the sun as being too near him, begins to re-appear or emerge out of his rays.

*Scruples of EMERSION*, an arch of the moon's orbit, which the moon's center passes over from the time she begins to emerge out of the shadow of the earth, to the end of the eclipse. See the articles *ECLIPSE*, *TRAJECTORY*, &c.

**EMERUS**, in botany, &c. the same with coronilla. See the article *CORONILLA*.

**EMERY**, in natural history, a rich iron-ore found in large masses of no determinate shape or size, extremely hard, and very heavy. It is usually of a dusky brownish-red on the surface, but when broken, is of a fine, bright, iron-grey, but not without some tinge of redness, and is spangled all over with shining specks, which are small flakes of a foliaceous talc, highly impregnated with iron. It is also sometimes very red, and then usually contains veins of gold. It makes no effervescence with any of the acid menstruums, and is found in the island of Guernsey, in Tuscany, and many parts of Germany.

Emery is said to have a corroding and almost caustic quality, but this without any just foundation. It is recommended by the antients as an astrigent and dentifrice. In this last intention, however, it must be used with great caution, as its hardness and sharpness will be apt to wear off the enamel of the teeth.

Emery is prepared by grinding in mills, and the powder is separated into parcels of different degrees of fineness by washing; these are called the first, second, and third sort; the first being that which remains longest suspended in water, the others, such as sink sooner from the same liquor, and from which it is poured, while yet turbid, to settle for the finer kind. These several sorts are of great use to various artificers in polishing and burnishing iron and steel works, marble, cutting and scolloping glass, &c. The lapidaries cut the ordinary gems on their wheels, by sprinkling the wetted powder over them, the wheels they use being usually of lead, with a small admixture of pewter, that their softness may admit the emery the better. It will not cut diamonds.

The red emery of Peru is in great esteem

with those who seek after the philosopher's stone ; but the king of Spain suffers none of it to be exported.

*Patty of EMERY*, a kind of dirty matter found on the lapidaries wheels, containing part of the powder of emery.

**EMETIC**, a medicine which induces vomiting. Emetics and purges are so much alike in their operations, that one cannot be well apprehended without the other. Thus much, therefore, is common to them both, that any medicine which so far vellicates the membranes and coats of the stomach and bowels as to draw them into convulsive twitches, or much accelerate their natural motions, will be emetic or cathartic, and sometimes both. But the action of vomiting is more properly a convulsive motion in the stomach than in the bowels. Whatsoever, therefore, so irritates the fibres of the stomach as to make them contract with great force, will throw its contents upwards, the vent being much larger that way than through the pylorus, which would send them down by stool. The difference, therefore, between an emetic and a cathartic, lies only in this, that the latter consists of such particles as pass the stomach without any violent vellications of the fibres, and the former, of such as have that effect almost as soon as they come there, so that an emetic seems stronger than a cathartic ; and this is the reason why a cathartic in an increased dose will prove emetic. Some are of opinion, that the substance itself which procures a vomit, is thrown up again in the first or second ejection ; and that the following sollicitations are caused by the acrimony of the juices which the first motions pumped, as it were, and occasioned to drain into the stomach. Be that as it will, it is certain that the action of vomiting, gives the strongest shakes to all the muscles and solids of the body that any motion can give ; and that the last reachings generally discover a drain of humours derived into the stomach from some considerable distance. The service to be expected from emetics, is not so much, therefore, what they discharge upwards, as what their violent emotions and concussions render fit for separation, and force through the skin and other outlets.

Tinctures, extracts, and resins, are always observed to operate rougher this way than more simple preparations ; and the reason seems to be, that such management of an ingredient, divides its parts

too much, and makes them come too intimately into contact with the fibres ; whence they are not so soon shaken off by their convulsive twittings, as more gross parts might be. Upon this account, therefore, most of the simples which come under this head, are best ordered in their natural forms ; and the elaborate preparations of the chemical pharmacy especially, produce no emetic so good as we find amongst nature's own productions. Sydenham lays it down as a rule, that whenever a vomit and bleeding are necessary, bleeding should always precede the exhibition of an emetic. Dr. Harris informs us, that antimonial vomits are very safe in the heat of the summer, but are very dangerous in the cold of the winter. When emetics are too violent, common salt is used to check their operation. Mild aromatics and opiates also have the same effect, and corroborating medicines whether taken internally, or applied by way of cataplasm to the region of the stomach. The infusion of ipecacuanha in wine, according to Dr. Shaw, is the most safe, gentle, and agreeable emetic hitherto known ; whence, says he, it may in most cases be properly substituted for the vinum benedictum, the tartarum emeticum, and all the other antimonial emetics which are attended with some degree of virulency and uncertainty in their operation.

EMETIC TARTAR.	} See {	TARTAR.
EMETIC POWDER.		ALGAROT.
EMETIC WINE.		WINE.

**EMEU**, in ornithology, the same with the cassowary. See **CASSOWARY**.

**EMINENCE**, a title of honour peculiar to cardinals. See the article **CARDINAL**.

**EMINENCE**, in the military art, a high or rising ground, which overlooks and commands the low places about it : such places within cannon-shot of a fort, are a great disadvantage ; for if the besiegers become masters of them, they can, from thence, fire into the fort.

**EMINENTIAL EQUATION**, an artificial equation, containing another equation eminently : it is sometimes used in the investigation of the areas of curved-lined figures. See **EQUATION**.

**EMINENTLY**, *eminenter*, a term used in the schools in regard to things which possess some quality or virtue in a high degree.

**EMIR**, a title of dignity among the Turk signifying a prince.

This title was first given to the calip'

but when they assumed the title of sultans, that of emir remained to their children, as that of Cæsar among the Romans. At length the title became attributed to all who were judged to descend from Mahomet by his daughter Fatimah, and who wear the green turban instead of the white. The Turks make an observation, that the emirs, before their fortieth year, are men of the greatest gravity, learning, and wisdom; but after this, if they are not great fools, they discover some signs of levity and stupidity. This is interpreted by the Turks as a sort of divine impulse in token of their birth and sanctity. The Turks also call the viziers, bashaws, or governors of provinces, by this name.

**EMISSARY**, in a political sense, a person employed by another to sound the opinions of people, spread certain reports, or act as a spy over other people's actions. See the article **SPY**.

**EMISSARY VESSELS**, in anatomy, the same with those more commonly called excretory. See the article **EXCRETORY**.

**EMISSION**, in medicine, a term used chiefly to denote the ejaculation of the semen, or seed, in the act of coition. See **COITION** and **GENERATION**.

**EMMENAGOGUES**, in pharmacy, medicines which promote the menses, or monthly courses, either by giving a greater force to the blood in its circulation, whereby its momentum against the vessels is increased; or by making it thinner, whereby it will more easily pass through any outlet. The former intention is helped by chalybeates, and other substances of the like gravity and elasticity; and this is the case of a leuco-phlegmatic habit, or the green-sickness, and its cure: but in the latter case, where the blood is florid and too high, attenuating alteratives and detergents are the only remedies, because they are fittest to carry the blood through these little apertures destined for its discharge into the uterus. Obstructions are removed by the five aperient roots, bithwort, rhubarb, bryony, and wall-flowers, especially if exhibited by way of decoction with some stimulus of the saline kind, such as borax.

**EMMERIC**, a city of Westphalia, in Germany, subject to Prussia: east long. 5° 45', north lat. 51° 48'.

**EMOLLIENTS**, in medicine and pharmacy, are such remedies as sleek and soften the asperity of the humours, and relax and supple the solids at the same time.

It is very easy to conceive how both these are brought about by the same medicine. By what means soever, whether in the stomach or any other parts, the juices have obtained a sharpness and asperity, so as to vellicate and render uneasy the fibres and nervous parts, which often happens, those things that are smooth, soft, and yielding, cannot but wrap up their points, and render them imperceptible, whence they may gradually, by the proper course of circulation, be brought to some convenient emunctory, without doing any injury by the way. Such parts likewise draw the fibres into spasms, keeping them too tense, and thereby frequently occasion obstructions of the worst kind. In all such cases, emollients lubricate and moisten the fibres, so as to relax them into their proper dimensions, whereupon such disorders cease.

The chief of the emollient and softening remedies, are the roots of marsh-mallow, of white lillies, of liquorice, and of viper's grass; the five emollient herbs, lettuce, bear's breech, pellitory of the wall, the flowers of elder, of melilot, of mallows, of mullein, of yarrow, of chamæmile, of white lillies, of borragé, of the wild poppy, of the lime tree, of the egyptian thorn, of violets, and, most of all, saffron; the seeds of flax, of fenugreek, of anise, of quinces, of fleabane, of white poppies; of the four greater and lesser cold-seeds, the filiqua, sweet almonds, figs, pine-nuts, pistaches, cherry-tree gum, gum arabic, gum tragacanth, shavings and jelly of hartshorn, human grease, that of a dog, of a capon, the marrows of their bones, the fat about their osmentum, bones, and mesentery; the native oils of animals, fresh butter, cream, milk itself, crystals of milk, spermaceti, honey, the yolk of an egg, and its white dried and reduced to a powder. Of the prepared medicines, oil of sweet almonds, linseed-oil, rape-oil, oil of the male balsam apple, decoctions of hartshorn and viper's grass, mixed with the juice of citrons, the ptisan, sweet whey, Ferrius's syrup of marsh-mallows, ointment of marsh-mallows, simple dyachylon plaster, that of melilot, and that of frog's spawn.

**EMPALEMENT**, an ancient kind of punishment, which consisted in thrusting a stake up the fundament.

**EMPALEMENT of a flower**, among herbalists, the same with calyx. See **CALYX**.

**EMPA-**

**EMPANELLING**, or **IMPANELLING**, in law. See the article **IMPANELLING**.

**EMPARLANCE**, or **IMPARLANCE**, in law. See the article **IMPARLANCE**.

**EMPASTING**, or **IMPASTING**, in painting, is the laying on of colours thick and bold, or the applying several lays of colours, so as they may appear thick.

The term is also used when the colours are laid distinct and asunder, and not softened or lost in each other. See the article **COLOURING**.

**EMPATTEMENT**, in fortification, the same with talus. See the article **TALUS**.

**EMPERESS**, or **EMPRESS**, denotes either the wife of an emperor, or a woman who governs singly an empire, in her own right. See **EMPEROR** and **EMPIRE**.

**EMPEROR**, *imperator*, a title of honour among the antient Romans, conferred on a general who had been victorious, and now made to signify a sovereign prince, or supreme ruler of an empire.

The title of emperor adds nothing to the rights of sovereignty ; it only gives pre-eminence above other sovereigns. The emperors, however, pretend, that the imperial dignity is more eminent than the regal. It is disputed whether emperors have the power of disposing of the regal title ; however this may be, they have sometimes taken upon them to erect kingdoms : thus it is that Bohemia, Prussia, and Poland, are said to have been raised to that dignity. In the East, the title of emperor is more frequent than with us ; thus the sovereign princes of China, Mogul, &c. are called emperors. In the West, the title has been a long time restrained to the emperors of Germany. The first who bore it was Charlemagne, who was crowned by pope Leo III. in 800. And it is to be observed, that there was not a foot of land or territory annexed to the emperor's title.

In the year 1723, the czar of Muscovy assumed the title of emperor of all the Russia's. The kings of France were also called emperors, when they reigned with their sons, whom they associated in the crown : thus Hugh Capet was called emperor, and his son Robert, king. The kings of England were antiently stiled emperors, as appears from a charter of king Edgar.

The emperor of Germany is a limited monarch in regard to the empire, though he is an absolute sovereign in most of his hereditary dominions ; the late emperors of the austrian family, having here-

ditary dominions, enumerated all of them in their title. Charles VI. was stiled emperor of the Romans, always august, king of Bohemia and Hungary, archduke of Austria, &c. but the present empress inheriting those countries, her consort enjoys only the title of emperor of the Romans, duke of Lorrain and Tuscany. The emperor creates dukes, marquises, and other noblemen ; and he appoints most of the officers, civil and military, in the empire : he is elected by the nine electors ; and he summons the general diet of the empire. See **ELECTOR** and **DIET**.

The emperor of Russia is an absolute hereditary monarch.

**EMPETRUM**, **BERRY-BEARING-HEATH**, in botany, a genus of the *trioecia-polygamia* class of plants, the flower of which consists of three petals, of an oval-oblong figure : the stamina are three very long capillary filaments : the fruit is a globe, depressed, and unilocular berry, containing nine seeds, gibbous on one side, and angulated on the other.

**EMPETRUM** is also used for the heath-spurge, a species of *tithymalus*. See the article **TITHYMALUS**.

**EMPHASIS**, in rhetoric, a particular stress of the voice and action, laid on such parts or words of the oration, as the orator wants to enforce upon his audience. See the article **ACCENT**.

**EMPHEREPYRA**, in mineralogy, a genus of *siderochita*, composed of various coats surrounding a nucleus of the same substance and structure with themselves. See the article **SIDEROCHITA**.

Of this genus there are several species, distinguished by the different colours of their coats or crusts, as brown, yellow, purple, green, white, &c.

**EMPHRACTICS**, in medicine and pharmacy, obstructing topics, such as, when applied to the body, adhere and stop the pores.

**EMPHYSEMA**, in surgery, a windy tumour generally occasioned in a fracture of the ribs, and formed by the air insinuating itself, by a small wound, between the skin and muscles, into the substance of the cellular or adipose membrane, spreading itself afterwards up to the neck, head, belly, and other parts, much after the manner in which butchers blow up their veal. See the articles **FRACTURE** and **RIBS**.

When an emphysema happens, it will be very proper to enlarge the opening in the skin,



skin, when too narrow, with the scalpel, and to bring down the tumor with frictions and bandage ; carrying the compression gradually towards the opening, so as to expel the included air by degrees. Emphysema, in Hippocrates, imports an inflation of the belly, and sometimes a tumour in general. It is surprising to what degree the cellular membrane will be inflated by the air retained and rarefied in its cells. To this purpose Mr. Mery gives a very remarkable history in the memoirs of the royal academy of sciences for 1713, which the curious may consult.

**EMPHYTEUSIS**, in the civil and canon law, the letting out of poor barren lands for ever, or, at least, for a long term of years, on condition of the tenant's cultivating, meliorating, or mending them, and paying a certain yearly consideration. Emphyteuses are a kind of alienations, differing from sale, in that they only transfer the *dominium utile*, the benefits of the ground, not the property, or simple fee. Among the Romans, they were at first temporary, afterwards perpetual.

**EMPIRE**, *imperium*, in political geography, a large extent of land, under the jurisdiction or government of an emperor. See the article **EMPEROR**. The most antient empire we read of, is that of the Assyrian, which was subverted through the effeminacy of Sardanapalus ; the persian empire was destroyed through the bad conduct of Darius Codomannus ; the grecian empire, by its being dismembered among the captains of Alexander the great ; and the roman empire, through the ill management of the last emperors of Rome.

Empire, or the empire, used absolutely, and without any addition, signifies the empire of Germany, called also in juridical acts and laws, the holy roman empire. Authors are at a loss under what form of government to range the empire : some will have it a monarchical state, by reason all the members thereof are forced to ask the investiture of their states of the emperor, and to take an oath of fidelity to him. Others will have it an aristocratic state, by reason the emperor cannot determine any thing without the concurrence of the princes : and, lastly, others will have the empire to be a monarcho-aristocratic state. See **ELECTOR**, **DIET**, **CIRCLE**, &c.

**EMPIRIC**, an appellation given to those physicians who conduct themselves wholly by their own experience, without study-

ing physic in a regular way. Some even use the term, in a still worse sense, for a quack who prescribes at random, without being at all acquainted with the principles of the art.

**EMPLASTER**, *emplastrum*, in pharmacy, the same with plaster. See **PLASTER**.

**EMPLASTICS**, the same with emphractics. See the article **EMPHRACTICS**.

**EMPRESS**, or **EMPERESS**. See the article **EMPERESS**.

**EMPRIMED**, a term used by sportsmen for a hart that has forsaken the herd.

**EMPRASTHOTONOS**, a species of convulsion, wherein the chin presses against the breast. See **CONVULSION**.

**EMPYEMA**, in medicine, a disorder wherein purulent matter is contained in the thorax or breast, after an inflammation and suppuration of the lungs and pleura ; which, if it be not timely discharged, not only obstructs respiration, but also returning into the blood occasions a continual hectic, with a consumption of the whole body, and other bad symptoms.

In order to discharge this matter, or blood extravasated into the cavity of the thorax, in wounds of that part, it must be perforated ; which operation is called paracentesis. See **PARACENTESIS**.

After the affected side is opened, the puss must be drawn off slowly, and at several times ; and the cavity is to be cleansed by injections of decoctions with honey : which done, the wound is to be healed, giving at the same time plenty of vulnerary decoctions inwardly, of such things as deterge and resist putrefaction. See the article **ANTISEPTICS**.

**EMPYREUM**, a term used by divines for the highest heaven, where the blessed enjoy the beatific vision.

Some of the fathers suppose the empyreum to have been created before the heavens which we behold. See **HEAVEN**.

**EMPYREUMA**, among chemists and physicians, the fiery taste or offensive smell which brandies, and other bodies prepared by fire, are impregnated with. See **DISTILLATION** and **BRANDY**.

**EMRODS**, or **HÆMORRHOIDS**. See the article **HÆMORRHOIDS**.

**EMULGENT**, or **RENAL ARTERIES**, those which supply the kidneys with blood ; being sometimes single, sometimes double on each side. See **ARTERY**.

**EMULSION**, in pharmacy, a soft liquid remedy, of a colour and consistence resembling milk. It is composed by draw-

ing

ing out the oily or milky part of seeds or kernels by confusion, with proper liquors. Emulsions, if carefully made, are a very neat form, but a very small part of the materia medica is reducible thereinto, or only those seeds which yield a soft milky juice; and therefore the only intention which this form can properly be prescribed for, is that of an emollient, though some few are given for other purposes, but they are not so suitable: oils, likewise, may, by the help of an egg, and a little of any of the turpentine ballams, be reduced under this head, and, if well managed, will make an elegant medicine. In all emulsions the seeds are to be husked or blanched, and beat in the mortar to a paste: then the liquors ordered are to be put in by a little at a time at first, and beat with the mafs, so that the whole pulp may be washed out, and nothing but a little like chaff be left behind: this is always to be done in a marble mortar, and with a wooden pestle.

**EMUNCTORY**; in anatomy, a general term for all those parts which serve to carry off the excrementitious parts of the blood and other humours of the body. Such more especially are the kidneys, bladder, and most of the glands. See the articles **KIDNEY**, **BLADDER**, &c.

**ENÆMON**, *εναίμων*, in medicine, an epithet often applied by Hippocrates and Galen, to such topical medicines as are appropriated to a wound newly inflicted, before the blood be stopped.

**ENÆOREMA**, in medicine, that pendulous substance which floats in the urine. It is also called *sublimamentum* and *nubecula*, from its resemblance to little clouds. See **URINE**, **SUBLIMAMENTUM**, and **NUBECULA**.

**ENALLAGE**, in grammar, is when one word is substituted for another of the same part of speech: a substantive for an adjective, as *exercitus victor*, for *victoriosus*; *scelus*, for *sceleratus*: a primitive for a derivative, as *dardana arna*, for *dardania*; *laticem lyæum*, for *lyæum*: an active for a passive, as *nox humida celo præcipitat*, for *præcipitatur*, &c.

**ENALLAGE**, in rhetoric, is a figure whereby the discourse is changed and reversed contrary to all the rules of the language; but this is not done altogether at pleasure, or without reason.

**ENALURON**, according, to Guillim, is a bordure charged with birds; tho' others will have it to signify, in orle, or form of a bordure. See the article **BORDURE**.

**ENAMEL**, a kind of coloured glass, used in enamelling and painting in enamel.

Enamels have for their basis a pure crystal-glass or frit, ground up with a fine calx of lead and tin prepared for the purpose, with the addition usually of white salt of tartar. These ingredients baked together, are the matter of all enamels, which are made by adding colours of this or that kind in powder to this matter, and melting or incorporating them together in a furnace.

For white enamel, Neri De Arte Vitriar. directs only manganese to be added to the matter which constitutes the basis. For azure, zaffer mixed with calx of brass. For green, calx of brass with scales of iron, or with crocus martis. For black, zaffer with manganese, or with crocus martis; or manganese with tartar. For red, manganese or calx of copper and red tartar. For purple, manganese with calx of brass. For yellow, tartar and manganese. And for violet-coloured enamel, manganese with thrice calcined brass.

In making these enamels, the following general cautions are necessary to be observed. 1. That the pots must be glazed with white glass, and must be such as will bear the fire. 2. That the matter of enamels must be very nicely mixed with the colours. 3. When the enamel is good, and the colour well incorporated, it must be taken from the fire with a pair of tongs. 4. The general way of making the coloured enamels is this: powder, sift, and grind all the colours very nicely, and first mix them with one another, and then with the common matter of enamels; then set them in pots in a furnace, and when they are well mixed and incorporated, cast them into water; and when dry, set them in a furnace again to melt; and when melted, take a proof of it. If too deep-coloured, add more of the common matter of enamels; and if too pale, add more of the colours.

Enamels are used either in counterfeiting or imitating precious stones, in painting in enamel, or by enamellers, jewellers, and goldsmiths, in gold, silvers and other metals. The two first kinds are usually prepared by the workmen themselves, who are employed in these arts. That used by jewelers, &c. is brought to us chiefly from Venice or Holland, in little cakes of different sizes, commonly about four inches diameter, having the mark of the

the maker struck upon it with a puncheon. It pays the pound 1 s. 7 <sup>1</sup>/<sub>2</sub> d. on importation, and draws back 1 s. 5 <sup>1</sup>/<sub>2</sub> d. at the rate of 4 s. per pound.

**ENAMELLING**, the art of laying enamel upon metals, as gold, silver, copper, &c. and of melting it at the fire, or of making divers curious works in it at a lamp. It signifies also to paint in enamel.

*The method of painting in enamel.* This is performed on plates of gold or silver, and most commonly of copper, enamelled with the white enamel; whereon they paint with colours which are melted in the fire, where they take a brightness and lustre like that of glass. This painting is the most prized of all for its peculiar brightness and vivacity, which is very permanent, the force of its colours not being effaced or sullied with time, as in other painting, and continuing always as fresh as when it came out of the workman's hands. It is usual in miniature, it being the more difficult the larger it is, by reason of certain accidents it is liable to in the operation. Enamelling should only be practised on plates of gold, the other metals being less pure: copper, for instance, scales with the application, and yields fumes; and silver turns the yellows white. Nor must the plate be made flat; for in such case, the enamel cracks; to avoid which, they usually forge them a little round or oval, and not too thick. The plate being well and evenly forged, they usually begin the operation by laying on a couch of white enamel (as we observed above) on both sides, which prevents the metal from swelling and blistering; and this first lay, serves for the ground of all the other colours. The plate being thus prepared, they begin at first by drawing out exactly the subject to be painted with red vitriol, mixed with oil of spike, marking all parts of the design very lightly with a small pencil. After this, the colours (which are to be before ground with water in a mortar of agate extremely fine, and mixed with oil of spike somewhat thick) are to be laid on, observing the mixtures and colours that agree to the different parts of the subject; for which it is necessary to understand painting in miniature. But here the workman must be very cautious of the good or bad qualities of the oil of spike he employs to mix his colours with, for it is very subject to adulterations. See OIL.

Great care must likewise be taken, that the least dust imaginable come not to your colours while you are either painting or grinding them; for the least speck, when it is worked up with it, and when the work comes to be put into the reverberatory to be red hot, will leave a hole, and so deface the work.

When the colours are all laid, the painting must be gently dried over a slow fire to evaporate the oil, and the colours afterwards melted to incorporate them with the enamel, making the plate red hot in a fire, like what the enamellers use. Afterwards that part of the painting must be passed over again which the fire hath any thing effaced, strengthening the shades and colours, and committing it again to the fire, observing the same method as before, which is to be repeated till the work is finished.

*Method of ENAMELLING by the lamp.* Most enamelled works are wrought at the fire of a lamp, in which, instead of oil, they put melted horse-grease, which they call caballine oil. The lamp, which is of copper or white iron, consists of two pieces, in one of which is a kind of oval plate, six inches long, and two high, in which they put the oil and the cotton. The other part, called the box, in which the lamp is inclosed, serves only to receive the oil which boils over by the force of the fire. This lamp, or where several artists work together, two or three more lamps are placed on a table of proper height. Under the table, about the middle of its height, is a double pair of organ-bellows, which one of the workmen moves up and down with his foot, to quicken the flame of the lamps, which are by this means excited to an incredible degree of vehemence. Grooves made with a gauge in the upper part of the table, and covered with parchment, convey the wind of the bellows to a pipe of glass before each lamp; and that the enamellers may not be incommoded with the heat of the lamp, every pipe is covered at six inches distance with a little tin plate, fixed into the table by a wooden handle. When the works do not require a long blast, they only use a glass-pipe, into which they blow with their mouth. It is incredible to what a degree of fineness and delicacy the threads of enamel may be drawn at the lamp. Those which are used in making false tufts of feathers are so fine, that they may be wound on the reel like silk or thread. The ficti-

tious jets of all colours, used in embroideries, are also made of enamel; and that with so much art, that every small piece hath its hole to pass the thread through wherewith it is sewed. These holes are made by blowing them into long pieces, which they afterwards cut with a proper tool.

It is seldom that the venetian or dutch enamels are used alone; they commonly melt them in an iron-ladle, with an equal part glass or crystal; and when the two matters are in perfect fusion, they draw it out into threads of different sizes, according to the nature of the work. They take it out of the ladle while liquid, with two pieces of broken tobacco-pipes, which they extend from each other at arm's length. If the thread is required still longer, then another workman holds one end, and continues to draw it out, while the first holds the enamel to the flame. Those threads, when cold, are cut into what lengths the workman thinks fit, but commonly from ten to twelve inches; and as they are all round, if they are required to be flat, they must be drawn through a pair of pincers while yet hot. They have also another iron-instrument in form of pincers, to draw out the enamel by the lamp when it is to be worked or disposed in figures. Lastly, they have glass-tubes of various sizes, serving to blow the enamel into various figures, and preserve the necessary vacancies therein; as also to spare the stuff and form the contours. When the enameller is at work, he sits before his lamp with his foot on the step that moves on the bellows, and holding in his left hand the work to be enamelled, or the brass or iron-wires the figures are to be formed on, he directs with his right the enamel thread, which he holds to the flame with a management and patience equally surprising. There are few things they cannot make or represent with enamel; and some figures are as well finished, as if done by the most skilful carvers.

**ENARTHROSIS**, in anatomy, a species of diarthrosis. See **DIARTHROSIS**.

**ENCANIA**, the name of three several feasts celebrated by the Jews in memory of the dedication, or rather purification, of the temple, by Judas Maccabeus, Solomon, and Zorababel.

This term is likewise used in church-history for the dedication of christian churches.

**ENCAMPMENT**, the pitching of a camp. See the article **CAMP**.

**ENCANTHIS**, in surgery, a tubercle arising either from the caruncula lachrymalis, or from the adjacent red skin; sometimes so large, as to obstruct not only the puncta lachrymalia, but also part of the sight, or pupil itself.

In this disorder, the tears continually run down the cheek, which greatly deforms the eye and face.

It is of two kinds, *viz.* mild, without hardness or pain; or malignant, which is livid and very painful. The mild kind is to be treated first by scarifying, and afterwards applying escharotic or caustic medicines; and if this proves insufficient, the tumour may be touched, but with great caution, with lapis infernalis; and to divert the humours from the eye, issues and setons, with phlebotomy and cooling purges, are proper. If all these fail, the surgeon is to extirpate the tumour; in which case, it is better to leave part of the morbid tubercle, than cut off any part of the lachrymal caruncle, as the remains of it may be afterwards cleared away by escharotics. After the operation, it is proper to apply deterring and healing medicines, or a collyrium of lapis tutiæ, myrrh, &c. till the wound is healed.

As to the malignant encanthis, inclining to be cancerous, it is generally better to let it alone, and to mitigate its uneasiness with cooling and lenient collyria, rather than exasperate it by the operation, or by escharotic medicines. *Heister.*

**ENCAUSTICE** and **ENCAUSTUM**, the same with enamelling and enamel. See **ENAMELLING** and **ENAMEL**.

**ENCEINTE**, in fortification, is the wall or rampart which surrounds a place, sometimes composed of bastions or curtains, either faced or lined with brick or stone, or only made of earth. The enceinte is sometimes only flanked by round or square towers, which is called a roman wall.

**ENCEPHALI**, in medicine, worms generated in the head, where they cause so great a pain, as sometimes to occasion distraction.

The encephali are very rare, but there are some diseases wherein they swarm; from whence we are told pestilential fevers have wholly arisen. Upon the dissection of one who died of this fever, a little, short, red worm was found in the head, which malmsey wine, wherewith horse-radish had been boiled, could only destroy. This medicine was afterwards tried on the sick, most of whom it cured.

The

The like worms have also been taken out by trepanning, and the patient cured. Those worms that generate in the nose, ears, and teeth, are also called encephali.

**ENCEPPE'**, in heraldry, denotes fettered, chained, or girt about the middle, as is usual with monkeys.

**ENCHANTER**, a person supposed to practise enchantment, or fascination. See **FASCINATION**, **WITCHCRAFT**, &c.

**ENCHANTER'S NIGHTSHADE**, in botany. See the article **CIRCÆA**.

**ENCHASING**, **INCHASING**, or **CHASING**, the art of enriching and beautifying gold, silver, and other metal-work, by some design, or figures represented thereon, in low relief. See the articles **RELIEVO**, and **SCULPTURE**.

Enchasing is practised only on hollow thin works, as watch-cases, cane-heads, tweezer-cases, or the like. It is performed by punching or driving out the metal, to form the figure, from within side, so as to stand out prominent from the plane or surface of the metal. In order to this, they provide a number of fine steel-blocks, or punchions, of divers sizes; and the design being drawn on the surface of the metal, they apply the inside upon the heads or tops of these blocks, directly under the lines or parts of the figures; then, with a fine hammer, striking on the metal, sustained by the block, the metal yields, and the block makes an indentation, or cavity, on the inside, corresponding to which there is a prominence on the outside, which is to stand for that part of the figure.

Thus the workman proceeds to chase and finish all the parts by successive application of the block and hammer, to the several parts of the design. And it is wonderful to consider with what beauty and justness, by this simple piece of mechanism, the artists in this kind will represent foliages, grotesques, animals, histories, &c.

**ENCHELYS**, *εχχελυς*, the **EEL**, in ichthyology. See the article **EEL**.

**ENCHELIDES** is also used to denote the capillary eels discovered by the help of microscopes in pepper-water, and the like. See the article **ANIMALCULE**.

**ENCHESON**, in old law-books, signifies the occasion, cause, or reason wherefore any thing is done.

**ENCHYSMA**, in medicine, the same with **ENEMA**. See the article **ENEMA**,

**ENCLAVE'**, in heraldry, denote a thing's being let into another, especially when the piece, so let in, is square.

**ENCLITICA**, in grammar, particles which are so closely united with other words, as to seem part of them, as in *virumque*, &c.

There are three enclitic particles in latin, viz. *que*, *ne*, *ve*: but there are a great many in the greek, as *τι*, *τε*, *μη*, *μοι*, *ου*, *σοι*, &c.

**ENCRASICHOLUS**, the **ANCHOVY**, in ichthyology. See **ANCHOVY**.

**ENCRATITES**, *encratite*, in church-history, heretics who appeared towards the end of the second century: they were called encratites, or continentes, because they gloried in abstaining from marriage, and the use of wine and animal food. Their chastity, however, was a little suspected, on account of their using all sorts of means to draw women into their sect, and always keeping company with them.

**ENCRAULOS**, the **ANCHOVY**. See the article **ANCHOVY**.

**ENCROACHMENT**, or **INCROACHMENT**, in law. See **INCROACHMENT**.

**ENCURECK**, a poisonous insect, frequent in Persia, thought to be a species of tarantula. See the article **TARANTULA**.

**ENCYCLOPÆDIA**, *ενκυκλοπαίδεια*, in literary history, the same with cyclopædia. See **CYCLOPÆDIA** and **DICTIONARY**.

**END FOR END**, in the sea-language, is said of a rope that has run quite out of the block, wherein it was reeved.

**ENDECAGON**, in geometry, the same with hendecagon. See **HENDECAGON**.

**ENDECASYLLABUS**. See the article **HENDECASYLLABUS**.

**ENDECERIS**, in antiquity, denotes a vessel, or galley, with eleven tires of oars.

**ENDEMIC**, or **ENDEMICAL DISEASES**, those to which the inhabitants of particular countries are subject more than others, on account of the air, water, situation, and manner of living. See the article **DISEASE**.

It has been always observed, that people of particular countries were peculiarly subject to particular diseases, which are owing to their manner of living, or to the air and effluvia of the earth and water. Hoffman has made curious observations on diseases of this kind: he observes, that the Laplanders have often distempers of the eyes, which is owing to their living in smoke, or being blinded with the snow;

that pleurifies and inflammation of the lungs are also very frequent among them ; and that the small-pox often rages there with great violence : he observes also, that swellings of the throat have always been common to the inhabitants of mountainous countries ; and the old roman authors say, Who wonders at a swelled throat in the Alps ? the people of Carinthia, Styria, the Hartz-forest, Transylvania, and the inhabitants of Cronstrad, he observes, are all subject to this disease, from the same cause : and it seems that these strumous swellings are owing to the water which they drink, and which, in mountainous places, is usually very much impregnated with sparry or stony particles. The French are peculiarly troubled with fevers, with worms, and with hydroceles, and sarcoceles ; and all these disorders seem to be owing originally to their eating very large quantities of chestnuts. The people of our own nation are peculiarly afflicted with hoarsenesses, catarrhs, coughs, dysenteries, and consumptions ; the women with the fluor albus, or whites ; and the children with a disease scarce known else where, which we call the rickets. In different parts of Italy, different diseases reign : at Naples the venereal disease is more common than in any other part of the world : at Venice, people are peculiarly subject to the bleeding piles. At Rome, tertian agues and lethargic distempers are most known : in Tuscany, the epilepsy : in Apulia, burning fevers, pleurifies, and that sort of madness which is attributed to the bite of the tarantula, and which, it is said, is only cured by music. In Spain, apoplexies are common, as also melancholy, hypochondriacal complaints, and bleeding piles. The Dutch are peculiarly subject to the scurvy, and the stone in the kidneys. Denmark, Sweden, Pomerania, and Livonia are all terribly afflicted with the scurvy. The Russians and Tartars are afflicted with ulcers made by the cold, of the same nature with what we call chilblanes : and in Poland and Lithuania there reigns a peculiar disease, called the plica polonica, so terribly painful and offensive, that scarce any thing can be worse. The people of Hungary are very subject to the gout and rheumatism ; they are more infested with lice and fleas than any other people in the world ; and they have a peculiar disease, which they call cremor. The Germans, in different parts of the empire, are subject to different reigning dis-

eases ; in Westphalia they have the peripneumonies and the itch : in Silesia, Franconia, Austria, &c. they are subject to fevers of the burning kind ; to hæmorrhages, to the gout, inflammations, and consumptions. In Constantinople the plague always rages. And in the West-indian islands, malignant fevers, and the most terrible colics are frequent.

**ENDED**, or **INDENTED**, in heraldry. See the article **INDENTED**.

**ENDEAVOUR**, or **ATTEMPT** to commit crimes, is only punishable by fine and imprisonment. See **INTENDMENT**.

**ENDICTMENT**, or **INDICTMENT**. See the article **INDICTMENT**.

**ENDIVE**, *endivia*, in botany, &c. the broad-leaved succory. See the article **CICHORIUM**.

Marigli describes a plant, which he calls sea-endive, from its resemblance to the common garden-endive.

**ENDLESS**, something without an end : thus authors mention endless rolls, the endless screw, &c. See the articles **ROLL** and **SCREW**.

**ENDORSE**, in heraldry, an ordinary, containing the eighth part of a pale, which Leigh says is only used when a pale is between two of them.

**ENDORSED**, *endorfz*, in heraldry, is said of things borne back to back, more usually called *adosse*. See **ADOSSE**.

**ENDORSEMENT**, or **INDORSEMENT**, in law. See **INDORSEMENT**.

**ENDOWMENT**, in law, denotes the settling a dower on a woman ; though sometimes it is used figuratively, for settling a provision upon a parson, on the building of a church ; or the severing a sufficient portion of tithes for a vicar, when the benefice is appropriated.

**ENEMA**, in medicine, the same with clyster. See the article **CLYSTER**.

**ENEMY**, in law, an alien or foreigner, who publicly invades the kingdom. Whether enemies come into the realm by themselves, or in company with english traitors, they are only dealt with according to the martial law, and not punished as traitors : yet where a subject of a foreign nation, who lives here under the king's protection, takes up arms against the government, he shall be punished as a traitor.

**ENERGUMENS**. in church-history, persons supposed to be possessed by the devil, concerning whom there were many regulations among the primitive christians. They were denied baptism, and the eucharist ;

charist; at least, this was the practice of some churches: and though they were under the care of exorcists, yet it was thought a becoming act of charity to let them have the public prayers of the church, at which they were permitted to be present. See the article **EXORCISM**.

**ENERGY**, *ενεργεια*, a term of greek origin, signifying the power, virtue, or efficacy of a thing. It is also used, figuratively, to denote emphasis of speech. See the article **EMPHASIS**.

**ENFANS PERDUS**, the same with forlorn hope. See the article **FORLORN**.

**ENFILADE**, in the art of war, is used in speaking of trenches, or other places, which may be scoured by the enemy's shot, along their whole length. In conducting the approaches at a siege, care must be taken that the trenches be not enfiladed from any work of the place. See the article **TRENCHES**.

**ENFRANCHISEMENT**, in law, the incorporating a person into any society or body politic: thus, where any person is enfranchised, or made free, of any city, borough, or company, he is said to have a freehold therein during life; and cannot, for barely endeavouring any thing against the corporation, forfeit the same. Naturalization is also another kind of enfranchisement. See **NATURALIZATION**.

**ENGASTRIMYTHI**, in pagan theology, the pythians, or priestesses of Apollo, who delivered oracles from within, without any action of the mouth or lips. See **PYTHIA**. The antient philosophers, &c. are divided upon the subject of the engastrimythi. Hippocrates mentions it as a disease. Others will have it a kind of divination. Others attribute it to the operation or possession of an evil spirit. And others to art and mechanism. M. Scottus maintains that the engastrimythi of the antients were poets, who, when the priests could not speak, supplied the defect by explaining in verse what Apollo dictated in the cavity of the bazon on the sacred tripod.

**ENGENDERING**, a term sometimes used for the act of producing or forming any thing: thus meteors are said to be engendered in the middle region of the atmosphere, and worms in the belly. See the articles **GENERATION**, **METEOR**, **WORM**, &c.

**ENGERS**, the capital of a county of the same name, in Germany, situated on the river Rhine, about seven miles north of Coblentz.

**ENGHIEN**, a city of Hainalt, about fourteen miles south-west of Brussels.

**ENGINEA**, an island on the north-east of the Morea, about fifty miles east of Corinth.

**ENGINE**, in mechanics, is a compound machine, made of one or more mechanical powers, as levers, pullies, screws, &c. in order to raise, cast, or sustain any weight, or produce any effect which could not be easily effected otherwise.

Engines are extremely numerous; some used in war, as the battering-ram, ballista, waggons, chariots, &c. others in trade and manufactures, as cranes, mills, presses, &c. others to measure time, as clocks, watches, &c. and others for the illustration of some branch of science, as the orrery, cometarium, and the like. See **BATTERING-RAM**, **BALLISTA**, &c.

In general we may observe, concerning engines, that they consist of one, two, or more of the simple powers variously combined together; that in most of them the axis in peritrochio, the lever, and the screw are the constituent parts; that in all a certain power is applied to produce an effect of much greater moment; and that the greatest effect, or perfection, is when it is set to work with four ninths of that charge which is equivalent to the power, or will but just keep the machine in equilibrio. See the articles **MAXIMUM** and **MECHANICS**.

In all machines, the power will just sustain the weight, when they are in the inverse ratio of their distances from the center of motion. See the articles **POWER** and **EQUILIBRIUM**.

It being of the utmost importance to diminish the friction of engines, several contrivances have been invented for this purpose. See the article **FRICTION**.

**ENGINE for extinguishing fires**, a machine for raising a considerable quantity of water, in one continued stream, for the extinguishing accidental fires.

The best engine of this kind is that of Mr. Newsham, an engine-maker of London, which is so contrived that part of the men who work it, exert their strength by treading, the very best way of working such engines; the whole weight of the body being successively thrown on the forces of the pumps, and even part of a man's strength may be added to the weight, by means of horizontal pieces, to which he may apply his hands when treading. This is the reason why, with the same number of men, his engine will throw

throw water farther, higher, and in greater quantities than any engines of the same size, hitherto contrived. See a perspective view of the whole engine, ready for working, in plate LXXXIX. n° 1.

The nature and effect of this engine will be easily understood from a perpendicular section of it represented *ibid.* n° 2. The water is raised by the pressure of the atmosphere, by the force of the pistons, and by the spring of condensed air, in the following manner: thus, when the piston R is raised, a vacuum would be made in the barrel TV, did not the water follow it from the inferior canal EM (through the valve H) which rises through the glass tube EF, immersed in the water of a vessel, by the pressure of the atmosphere on the surface thereof. By the depression of the piston R, the water in the barrel TV is forced through the superior canal ON, to enter by the valve I, into the air-vessel *abcd*; and the like being done alternately by the other barrel WX, and its piston S, the air-vessel is by this means continually filling with water, which greatly compresses the air above the surface of the water in the vessel, and thereby proportionably augments its spring, which is at length so far increased, as to re-act with great force on the surface YZ of the subjacent water; which ascending through the small tube *ef*, to the stop-cock *g*, is there, upon turning the cock *p*, suffered to pass through a pipe *h*, fixed to a ball and socket, from the orifice of which it issues with a great velocity, to a very great height or distance, in a small continued stream, directed every way, or to any particular place, by means of the ball and socket.

The greatest artifice of this engine is its contrivance to produce a continued stream, which is done by compression, and the consequent increased elasticity of the air in the barrel *abcd*, called the air-vessel. See the article AIR.

When, therefore, the air-vessel is half filled with water, and the air thereby compressed into half its first space, its spring will be equal to twice the pressure of the atmosphere; so that, on turning the stop-cock *p*, the air within pressing on the subjacent water with twice the force it meets with from the external air in the pipe *ef*, will cause the water to spout out of the engine to the height of 32 or 33 feet, if the friction be not too great. When the air-vessel is  $\frac{2}{3}$  full of water,

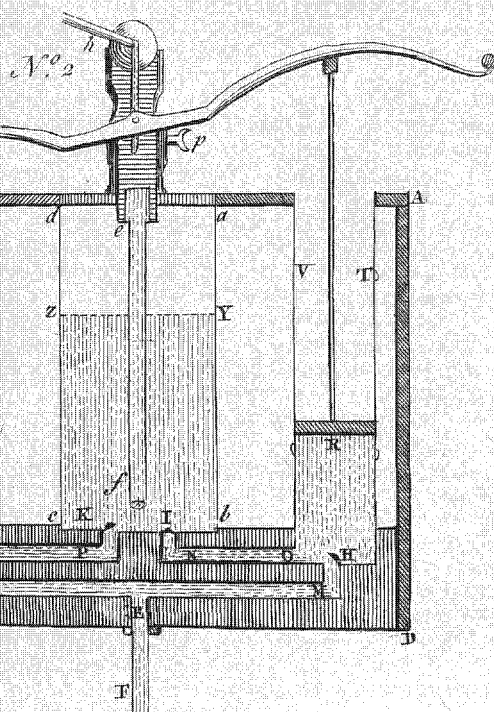
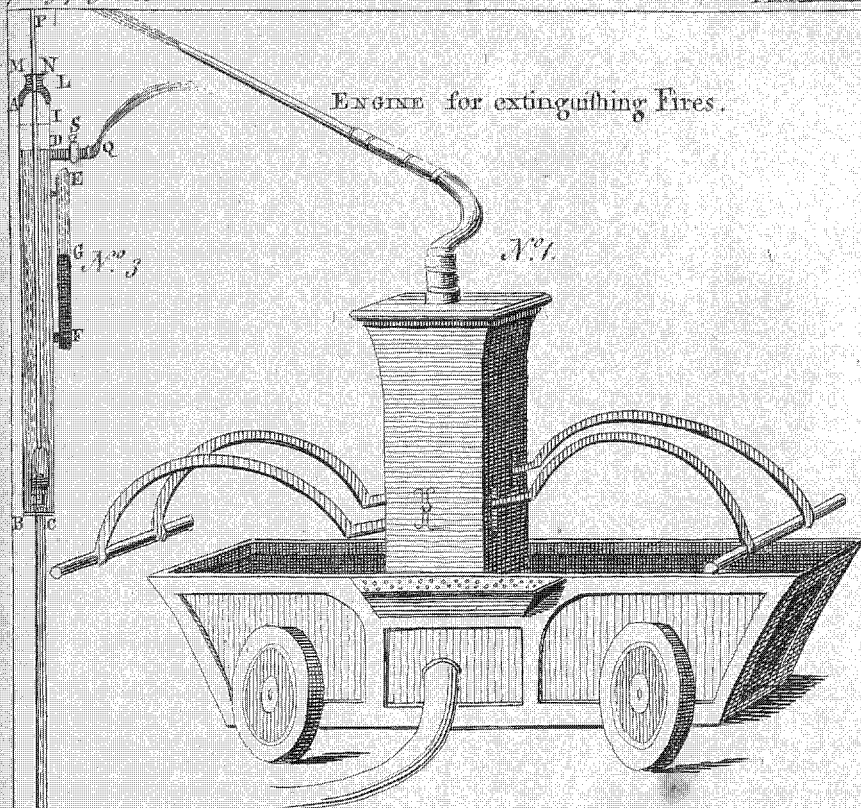
the space which the air takes up is only  $\frac{1}{3}$  of its first space; whence its spring being three times as great as that of the common air, it will project the water with twice the force of the atmosphere, or throw it to the height of 64 or 66 feet. In the same manner, when the air-vessel is  $\frac{3}{4}$  full of water, the air will project it to the height of 96 or 99 feet; and when  $\frac{4}{5}$  full of water, to the height of 132 feet. Hence it is easy to calculate the different heights to which the water will rise, as in the following table.

Height of the water.	Height of the compressed air.	Proportion of the air's spring.	Height to which the water will rise.
1	$\frac{1}{2}$	2	33 feet.
2	$\frac{1}{3}$	3	66
3	$\frac{1}{4}$	4	99
4	$\frac{1}{5}$	5	132
5	$\frac{1}{6}$	6	165
6	$\frac{1}{7}$	7	198
7	$\frac{1}{8}$	8	231
8	$\frac{1}{9}$	9	264
9	$\frac{1}{10}$	10	297

As the air-vessel is the cause of the continued stream, we may naturally infer, that if such an air-vessel were adapted to the common house-pump, it would become a useful engine for extinguishing accidental fires. Now this may be effected in the following or some other analogous manner: let ABCD (*ibid.* n° 3.) be the barrel of the pump, PH the rod and piston, CW the pipe going down to the water of the well at W. Towards the lower part of the barrel is a short tube, by which the air-vessel FE is fixed to, and communicates with, the barrel of the pump. AMNL is a collar of leather, so fixed on the top of the barrel, and adapted to the rod, that it may move freely in the leathers, without permitting the air to pass in or out between. The nozzle or spout D, has a stop-cock S, to let out or keep in the water at pleasure. Q is a piece screwed on, to direct the stream, by a small leather-pipe at the end. When the piston is raised from the bottom of the pump-barrel, the water above will be forced into the air-vessel, and there compress the air; it will also compress the air on the top of the barrel, for the water will not be higher than the spout D at first, when the stop cock is shut; but afterwards,



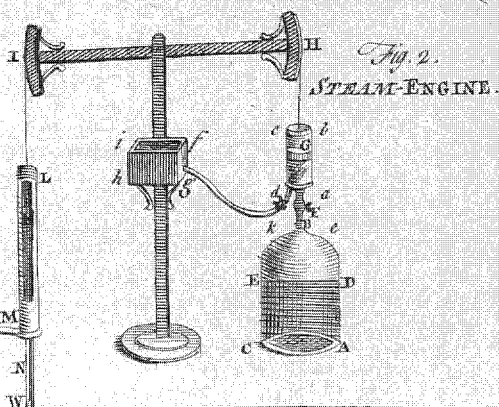
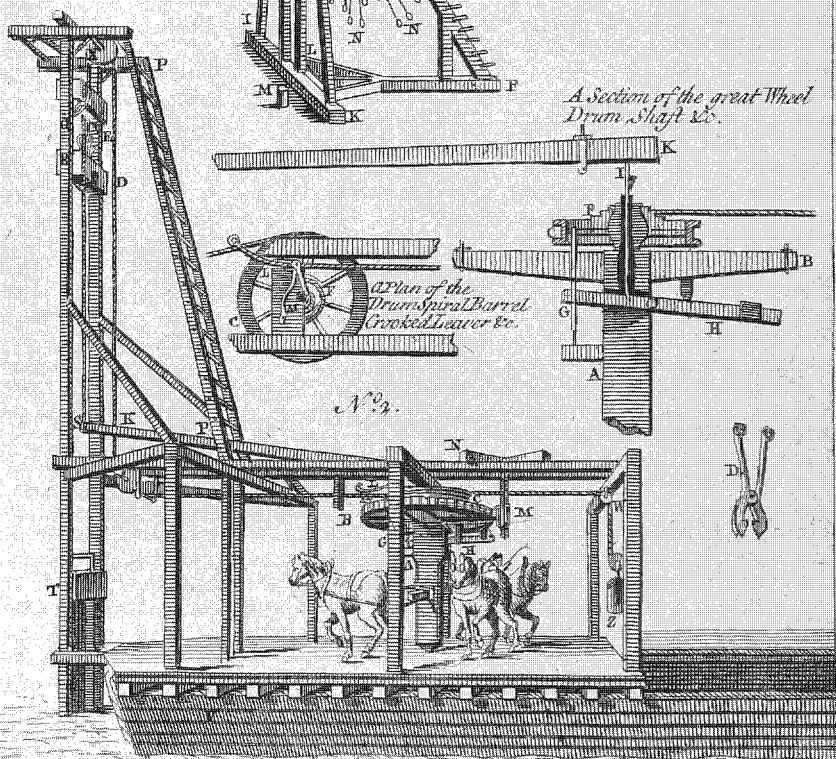
ENGINE for extinguishing Fires.







*Fig. 1. PILE-ENGINES*



afterwards, as the air is confined, it will be compressed at top, the water rising to I. This compressed air, in each place, will act upon the water by its spring, and, upon turning the stop-cock, will force it out in a continued stream through the pipe at Q, and that with a greater or lesser degree of force, as occasion requires, that being absolutely in the power of the person working the pump.

**Pile-ENGINE**, one contrived for driving piles, whereof there are several kinds. See the article **PILE**.

The most common and simple engine of this kind, as represented in plate XC. fig. 1. n<sup>o</sup> 1. consists of the cill K I, and the frame F L, on which are fixed the upright pieces L H and L G, supported by the side braces C, C, and the hind brace F E (which has pins on it to make it serve as a ladder) and held together by a square collar E D. The rammer A, being a very heavy piece of wood, or iron, slides up and down between the cheeks or upright pieces L H, L G, and is drawn up by means of its hook B, with two ropes H O, G O, having each five smaller ropes with handles at N, N, for ten men to pull up the rammer to a certain height (the great ropes running over two pulleys or rollers on the iron-pin H G) and then let it fall again all at once upon the head of the pile at M, to drive it into the ground. Now, suppose the rammer A, weighs 500 lb, and falls the height of one foot, it will fall that height in a quarter of a second, and consequently have a velocity able to carry it uniformly 2 feet in the same time, that is, at the rate of 8 feet in a second, at the very instant it strikes the pile M. Therefore, measuring the mass by the velocity, *viz.*  $500 \times 8$  we shall have 4000 for the momentum of the rammer with such a fall. See the article **DESCENT**. But if the rammer be raised up to the height of four feet, it will fall that height in half a second, and have, at the time of percussion, a velocity to carry it 8 feet in half a second, without any farther help from gravity, so that we must now multiply 16 feet (the present velocity, since it goes at the rate of 16 feet in a second) by 500, the mass of the rammer, which will give us a double momentum, wherewith it will strike the pile in this last case; for  $500 \times 16 = 8000$ . If we consider any other height from which the rammer falls (for one may employ a capstan windlass, or pulleys to raise it to a very great height) the momentum

with which it strikes the pile, will always be as the square root of the height from which the rammer fell.

If a pile is to be driven obliquely, the engine must be set so that the cheeks may have the same obliquity, and the blow will still be perpendicular to the head of the pile; but then the force of the blow must not be estimated from the length, but from the height of the descent, in the manner already shewn.

*Mr. Valour's ENGINE for driving piles*, used at the new bridge of Westminster, is constructed as follows. A (plate XC. n<sup>o</sup> 2.) is the great shaft, on which are the great wheel and drum: B the great wheel with cogs, that turns a trundle-head with a fly, to prevent the horse's falling when the ram is discharged; C the drum on which the great rope is wound; D the follower (with a roller at one corner) in which are contained the tongs, to take hold of the ram, and are fastened to the other end of the great rope, which passes over the pulley, near the upper end of the guides between which the ram falls; E the inclined planes, which serve to open the tongs, and discharge the ram; F the spiral barrel that is fixed to the drum, on which is wound a rope with a counterpoise, to hinder the follower from accelerating, when it falls down to take up the ram; G the great bolt which locks the drum to the great wheel; H the small lever, which has a weight fixed at one end, passes through the great shaft below the great wheel, and always tends to push the great bolt upwards, and lock the drum to the great wheel; I the forcing bar, which passes thro' the hollow axis of the great shaft, bears upon the small lever, and has near the upper end a catch by which the crooked lever keeps it down; K the great lever, which presses down the forcing bar, and discharges the great bolt at the time the long end is lifted up by the follower; L the crooked lever, one end of which has a roller, that is pressed upon by the great rope, the other end bears upon the catch of the forcing bar during the time the follower is descending; M the spring that presses against the crooked lever, and discharges it from the catch of the forcing bar as soon as the great rope slackens, and gives liberty to the small lever to push up the bolt.

By the horse's going round, the great rope is wound about the drum, and the ram is drawn up, till the tongs come between

the

the inclined planes, where they are opened, and the ram is discharged.

Immediately after the ram is discharged, the roller, which is at one end of the follower, takes hold of the rope that is fastened to the long end of the great lever, and lifts it up; the other end presses down the forcing bar, unlocks the drum, and the follower comes down by its own weight.

As soon as the follower touches the ram, the great rope slackens, and the spring *M* discharges the crook *i* lower from the catch of the forcing bar, and gives liberty to the small lever to push up the great bolt, and to lock the drum to the great wheel, and the ram is drawn up again as before.

**Steam-ENGINE**, a machine to raise water by fire, or rather by the force of water turned into steam.

The following is a description of this engine in its first state, and original simplicity. *ABC* (plate *XC*. fig. 2.) is a copper-vessel, partly filled with water to *DE*, which, being set over a fire and made to boil, will fill the upper part *DBE* with an elastic vapour, the sufficient strength whereof is known by its forcing open a valve at *e*: this heated elastic steam is, by turning a cock at *F*, let into the barrel *abcd*, where, by its elastic force, it raises the piston *G*, which drives the air above it through a proper clack at the top. After this, that the piston may by its weight descend, a little cold water from the cistern *fgbi*, is let in at the bottom by turning a cock at *h*, which, in form of a jet, condenses the hot steam in the barrel into 13000 times less space than before it took up, which make a sufficient vacuum for the piston to descend in. The piston *G*, and lever *HI* being thus put into motion, do accordingly raise and depress the piston *K* in the barrel of the forcing pump *LM*, on the other side; which, by the pipe *N*, draws the water from the depth *W*, and forces it to rise and spout through the tube *O*, continued to any height at pleasure. See **PUMP**.

Thus is the steam-engine a very simple and plain machine, where a very powerful stroke for working of pumps is performed by only turning two cocks alternately; and yet a person who knows nothing of it, would imagine it to be very complex, by the number of parts that offer themselves to view. But here we must distinguish between what performs the material operations of the engine, and what

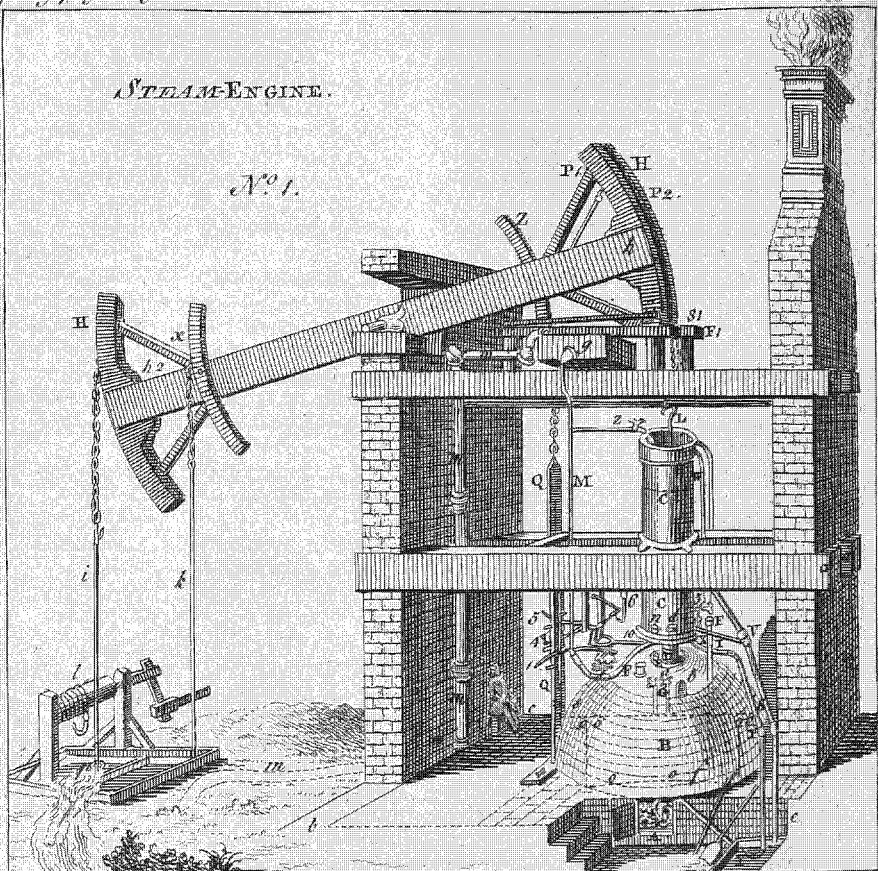
serves for conveniency and the just regulation of the said operations; for not above the hundredth part of the power of this engine is employed to turn the cocks and regulate all the motions, as will appear from what follows.

The structure of the steam-engine, as used at present, is represented in plate *XCI*. n<sup>o</sup> 1. concerning which we are to observe, 1. That there may be always water in the cistern *g*, to inject into the steam to condense it, there is an arch *x*, fixed near the arch *H*, at the pump end, from whence another pump-rod *k*, with its piston, draws water from a small cistern near the mouth of the pit, supplied from the water raised at *p*, and forces it up the pipe *mmm*, to keep the injecting cistern *g* always full. 2. As the piston *G* which moves up and down the cylinder ought to be air-tight, a ring of leather, or a piece of match, which lies upon its circumference next to the inside of the cylinder, must be kept moist and swelled with water; this is supplied from the injecting cistern by a small pipe *z*, always running down upon the piston, but in a very small quantity, if the work be well performed. *L* is a leaden cup, whose office is to hold the water that lies on the piston, lest it should flow over. When the piston is arrived at its greatest height in the cylinder, as *W*, at which time if the cup is too full, the water will run down the pipe *L'V*, into the waste-well at *Y*. 3. As the water, in the boiler *B*, must waste by degrees, as it is constantly producing steam, and that steam continually let out for working the engine, there ought to be a constant supply of the water to boil: this is performed by means of the pipe *Ff*, about three feet long, going down a foot under the surface of the water in the boiler, with a funnel *F*, at top, always open, and supplied by the pipe *W*, with water from the top of the cistern, which has the advantage of being always warm, and, therefore, not apt to check the boiling of the water in the copper. 4. That the boiler may not have the surface of the water too low (which would endanger bursting) or too high (which would not leave room enough for steam) there are two gauge-pipes at *G*, one going a little below the surface of the water when at a proper height, and the other standing a little above it: when every thing is right, the stop-cock of the shorter pipe being opened gives only steam, and that of the long one

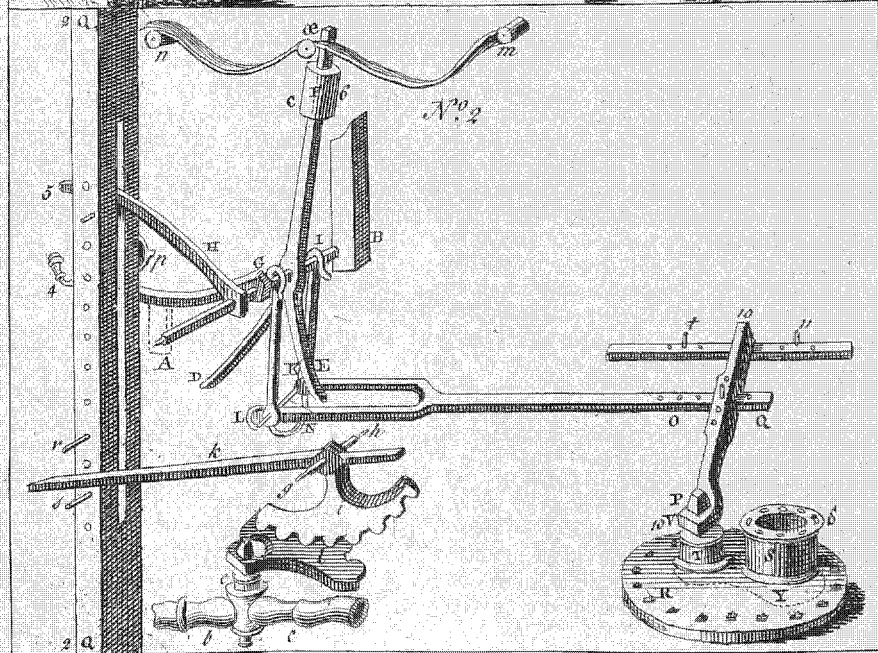


STEAM-ENGINE.

N<sup>o</sup> 1.



N<sup>o</sup> 2.





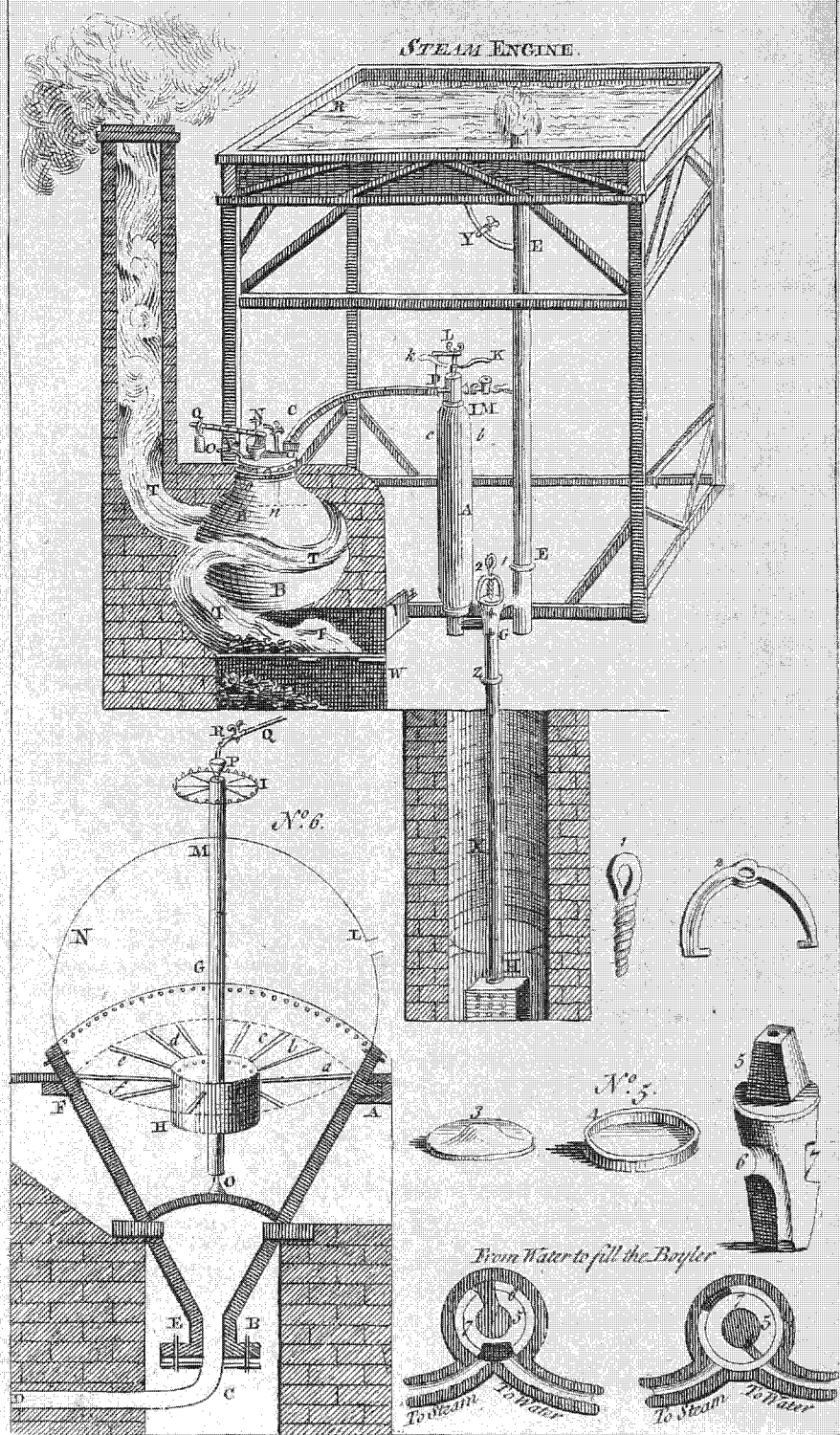
one water ; but if otherwise, both cocks will give steam when the surface is too low, and both give water when it is too high ; and hence the cock which feeds the boiler at F may be opened to such a degree as always to keep the surface of water to its due heighth. 5. As cold water is injected into the cylinder at every stroke, and as that water might in time fill the cylinder, and hinder the operation of the engine, there is a pipe coming from the bottom of the cylinder *d T Y*, called the eduction pipe, through which the water that has been injected, comes down every time the steam is let into the cylinder. This eduction pipe goes an inch or two under water in the waste well Y, and having its end turned up is shut with a valve Y to keep out the air from pressing up the pipe, but permitting the injected air coming the other way to be discharged ; by which means the cylinder is kept empty. 6. Left the steam should grow too strong for the boiler, and burst it, there is a valve fixed at *b* with a perpendicular wire standing up from the middle of it, to put weights of lead upon, by which to examine the strength of the steam pushing against it from within. Thus the steam is known to be as strong as the air, if it will raise up so much weight on the valve as is at the rate of 15 lb. to an inch square ; because that is the weight of the air, nearly, on every inch square. When the steam becomes stronger than what is required, it will lift up the valve and go out. This valve is called the puppet-clack. 7. The steam is always in a fluctuating condition, yet never  $\frac{1}{10}$  stronger or weaker than common air. For it has been found that the engine will work well, when there is the weight of one pound on every square inch of the valve *b*. This shews that the steam is then  $\frac{1}{15}$  part stronger than the common air. Now as the heighth of the feeding pipe from the funnel F to the surface of the water Ss is not above three feet, and  $3\frac{1}{2}$  feet of water is  $\frac{1}{10}$  of the pressure of air ; if the steam were  $\frac{1}{10}$  part stronger than air, it would push the water out at E ; which since it does not do, it cannot be stronger than air, even in this case, where the regulator being shut, it is most of all confined. 8. When the regulator is open, the steam gives the piston a push on the

underside, then occupying more space, the steam comes to be a ballance only for the outward air, and so only sustains the piston ; but the over weight of the pump-rods, at the contrary end of the beam *b z*, draws up the piston beyond C as far as W. The steam, then, expanded so as to fill up all the cylinder, would not quite support it, if it was not for the over weight above-mentioned. If this was not true, when the end *b z* is down as low as it can go, and rests upon the beams that bear its center, the chain L H above the piston would grow slack, and the piston might sometimes be pushed out of the cylinder, which never happens. Again, when first the steam is let into the cylinder, the injected water is pushed out at the eduction pipe *d T Y*, and is all out of the cylinder by that time the piston is got up to C. If then the steam was stronger than air, it would fly out at Y after the water, the valve Y not being loaded. If it were exactly equal to the strength of the air, it would just drive all the water out at Y, but could not follow itself, the pressure being equal on each side of the valve by supposition. If it be weaker than the air, it will not force all the water out of the pipe *d T Y*, but the surface will stand, suppose at T, where the column of water T Y added to the strength of the steam, is equal to the pressure of the air. When the steam is  $\frac{1}{10}$  weaker than the air, the height T Y is equal  $3\frac{1}{2}$  feet. Now since the whole perpendicular distance from *d* to Y is but four feet, and the steam is always sufficient to expel the water ; it is plain it can never be more than  $\frac{1}{10}$  part weaker than the air, when weakest. 9. As there is air in all the water injected, and that air cannot be taken out, or condensed with the steam by the jet of cold water coming in at *n*, the whole operation would be disturbed, and only a very imperfect vacuum made, were it not for the following contrivance. We are to remember that when steam is become as strong as air, it is above sixteen times rarer ; so that air will precipitate in steam, as quicksilver would in water. Therefore all the air extricated from the injected water, lies at the bottom of the cylinder over the surface of so much of the injected water as is come down to *d n*. Now there is without the cylinder at 4, a little cup with a valve, and from

under the valve, a pipe going laterally into the cylinder above its bottom to receive the air into the cup. When, therefore, the steam first rushes into the cylinder, and is a little stronger than the outward air, it will force the precipitated air to open the valve at 4, and make its escape; but the steam cannot follow, because it is weaker than the external air, as the piston, by ascending, gives it room to expand. This valve from the noise it makes is called the snifting clack. 10. But amongst the greatest improvements of this engine, we may reckon that contrivance by which the engine itself is made to open and shut the regulator and injection-cock, and that more nicely than any person attending could possibly do it. For if the man who turns the regulator at E, and the injection cock N, when the piston is coming down, opens the regulator and lets in the steam too soon to raise the piston again, the stroke will be shorter than it ought to be; and if he does not open the regulator soon enough, the piston coming down with a prodigious force, will very probably strike against the throat pipe D at d, and crush it to pieces. Likewise when the regulator is open, the steam going into the cylinder, and the piston rising, the stroke will not have its full length, if the steam is turned off, and the cold water injected too soon; and if injected too late, the steam may throw the piston quite out of the cylinder's top at L. To prevent, therefore, all such accidents, there is fixed to an arch Z, at a proper distance from the arch P, a chain, from which hangs a perpendicular piece, or working beam QQ, which comes down quite to the floor, and goes through it in a hole which it fits very exactly. This piece has a long slit in it, and several pin holes and pins for the movement of several levers destined to the office of opening and shutting the cocks after the following manner. 11. Between two perpendicular pieces of wood on each side of P, there is a square axis AB (*ibid.* n<sup>o</sup> 2.) which has upon it several iron pieces of the lever kind. The first is the piece CED called the Y, from its representing that letter inverted by its two shanks, E and D; on the upper part is a weight F, to be raised higher and lower, and fixed as occasion requires. This Y is fixed very fast upon the said iron axle AB.

12. From the axle hangs a sort of an iron stirrup, IKLG, by its two hooks IG, and having on the lower part two holes K L, through which passes a long iron pin LK, and keyed in the same. When this pin is put in, it is also passed thro' the two holes in the ends EN of the horizontal fork or spanner EQN, joined at its end Q to the handle of the regulator V 10. From Q to O are several holes, by which the said handle may be fixed to that part of the end which is most convenient. 13. Upon the axis AB is fixed at right angles to the Y an handle or lever G 4, which goes on the outside of the piece QQ, and lies between the pins. Another handle is also fastened upon the same axle, *viz.* H 5, and placed at half a right angle to the former G 4: this passes through the slit of the piece QQ, lying on one of its pins. Hence we see that when the working beam goes up, its pin in the slit lifts up the spanner H 5, which turns about the axle so fast, as to throw the Y with its weight F from C to 6, in which direction it would continue to move after it passed the perpendicular, were it not prevented by a strap of leather fixed to it at *a*, and made fast at the ends *m* and *n*, in such manner as to allow the Y to vibrate backwards and forwards about a quarter of a circle, at equal distance on this side and that of the perpendicular. 14. As things are represented in the figure, the regulator is open, its plate TY being shewn on one side of the pipe S, which joins the cylinder and boiler. The piston is now up, and also the working beam near its greatest height, the pin in the slit has so far raised the spanner H 5, that the weight F on the head of the Y is brought so far from *n*, as to be past the perpendicular and ready to fall over towards *m*, which when it does, it will by its shank E, strike the iron pin K L with a smart blow, and drawing the fork O N horizontally towards the beam Q, will draw the end 10 of the regulator towards *i*, and thereby shut it, by slipping the plate Y under the holes of the throat-pipe S. 15. Immediately after the regulator is shut, the beam rising a little higher with its pin S on the outside upon the lower part, lifts up the end *i* of the handle of the injecting-cock, and opens it by the turning of the two parts with teeth. The jet immediately making a vacuum, the beam again descends, and the pin *n* depressing





depressing the handle *k i*, shuts the injection-cock; and the beam continuing to descend, the pin *p* bears down the handle *G 4*, and throwing back the *Y*, its shank *D* throws forward the fork *N Q*, and again opens the regulator to receive fresh steam. After this every thing returns as before, and thus is the engine most wonderfully contrived to work itself.

16. Many years after the engine had been made, as above described, it received another improvement of very great advantage, and that was, instead of feeding the boiler with warm water, from the top of the cylinder (fig. n<sup>o</sup>. 2.) by the pipe *W* above, and *F f* below, they contrived to supply it with the scalding hot water which came out of the eduction-pipe *d T Y*, which now, instead of going into the waste well at *Y*, was turned into the boiler on the top, and as the eduction pipe before went out at the side of the cylinder, it was now inserted in the bottom of it; and though the pressure of the steam in the boiler be somewhat stronger than in the cylinder, yet the weight of water in the eduction-pipe being added to the force of steam in the cylinder will carry the water down continually, by overcoming the resistance in the boiler.

This is the lever-engine with the improvements of Mr. Newcomen and others; but as captain Savary's, or rather the marquis of Worcester's, is very cheap in respect of this machine, and as it is also applicable with great advantage when the height to which the water is to be raised does not exceed 100 or 150 feet, we shall here subjoin a view of that engine, with the improvements of Dr. Defaguliers.

The boiler *BB* (plate *XCII.*) is a large copper body of a globular form, which will best of all withstand the very great force of steam that in this case is necessary. Round the body of this boiler the fire and flame are conducted as shewn at *T T T*. It has a copper-cover screwed on, which contains the steam-pipe *C D*, and two gage-pipes *n, o*, which by turning their cocks, shew the height of the water within as in the other engine. On the same cover *P* is a valve, over which lies a steel-yard, with its weight *Q* to keep it down, the strength of the vapour being this way most exactly estimated. For being in the nature of a lever of the third sort, it is plain, if the beam of

the lever be divided into ten equal parts, and the first of them be upon the middle of the valve, and the weight *Q* hangs at the 2<sup>d</sup>, 3<sup>d</sup>, 4<sup>th</sup>, &c. divisions, that then the force of the steam which can raise up the valve will be 2, 3, 4, &c. times as great as the weight. If the area of the valve be a square inch, and  $Q = 15$  lib. hanging at the second division is raised by a steam pushing up the valve, it will shew that the steam will then press with the force of two atmospheres, and so on to ten atmospheres; but great care must be then taken that the steam so very strong burst not the boiler to pieces. The steam is carried from the boiler to a copper-vessel *A*. by means of the pipe *C D*, and is let into it by turning the handle *K* of the steam-cock *D I*. The key of this cock is kept down by the screw *L*, held up by the Gibbet *D L*. The handle turned from *K* to *k* admits a passage to the steam into the copper-receiver *A*. This receiver *A* communicates at bottom with the sucking pipe *Z H* going down to the water *H* in the well *X*, and above with the forcing pipe *E E*, which goes up a little above the water of the reservoir *R*, and between these pipes are two valves *F* and *G* both opening upwards. The steam being let in upon the water of the receiver *A*, forces it up through the valve *F*, and the pipe *E E* to the reservoir, and then the receiver is full of hot steam. This steam in the receiver is condensed by a jet of cold water coming from the forcing pipe by the small pipe *M I*, being let in and shut off by the cock at *M*. The steam being condensed by this jet will be reduced within a very small space, and so make a vacuum, upon which the water in the well will rush up the forcing pipe to restore the equilibrium, and thus again fill the receiver *A*, the little air being compassed within a small compass at the top above *b c*. That there may be always water in the force-pipe for the jet, there is a little pipe which brings the water to it from the reservoir with the small stop-cock *Y*, to shut it off upon occasion. The valves at *F* and *G* are examined at any time by unscrewing the pin *r* to loosen the strap *2*, and let down the flanch *3*, all which parts are shewn larger in the figures n<sup>o</sup>. 5. By the particular contrivance of the cock at *D I*, and its key, the water is made to pass from the force-pipe to the boiler to supply the waste in steam.

steam. This is plainly shewn in the sections of the cock and key, where 5 is the top of the key, 6 is a hole on one side, which goes down to the bottom to convey the steam, or jet of water alternately to the receiver; 7 is a notch on the other side to take in the water from the force-pipe, and conduct it to the boiler B. How this is done is easy to conceive from a view of the two sections of the cock and key, in two positions within it. The boiler may hold about five or six hogheads, and the receiver one hoghead. It will work four or five hours without recruiting: about four strokes a minute will produce upwards of 200 hogheads per hour. This steam makes a vacuum so effectually, as to raise water from the well to the height of twenty-nine or thirty feet; and suppose the steam able to lift up the steelyard with its weight hanging at the 6th division, it will then be able to raise a column of water above fifty yards high, as being then six times stronger than the pressure of the atmosphere, as is easily understood from what has been said upon the fire-engine, the water being raised in a similar manner in both machines, there by the pressure of condensed elastic air, and here by the pressure of rarefied elastic steam. See the article *ENGINE for extinguishing fires*.

This engine consists of so few parts, that it comes very cheap in proportion to the water that it raises, but it has its limits. On the other hand, the lever-engine, often called Newcomens, has its limits also; that is, it must not be too small, for then it will have a great deal of friction in proportion to the water that it raises, and will cost too dear; having as many parts as the largest machines, which are the best and cheapest in proportion to the water they raise.

In the philosophical transactions there is an account of an improvement made in the steam-engine by Mr. Payne, as follows. He has contrived two iron-pots or vessels of a conical form inverted as represented by ABEF (n<sup>o</sup> 6.) on the upper part of which is fixed a globular copper-head, of about 5½ feet diameter, as LMN. Then there is placed on the inside a small machine H, called the dispenser, with spouts *a b c d e*, &c. round

the sides fixed to it, and the bottom thereof rests on a center pin O. In this machine is fixed an upright tube G with holes at the bottom, and a funnel P on the top, to receive a spout of water from a conduit-pipe Q, by the stop-cock R. Two or more of these vessels are placed in a reverberatory arch for conveying the intense heat of a strong fire, the flame whereof encompasses the iron-vessels, and keeps them in a red heat during the time of their use, at which time the cog-wheel I being turned by proper machinery, whirls the dispenser about with great velocity, and causes the water in it to fly through the spouts against the sides of the red hot pots. By this means, the greatest part of the water is converted into vapour or elastic steam, which is conveyed by a common pipe and cock to the barrel of the engine to put the piston in motion, and the waste water is conveyed away at bottom by means of a pipe CD, with a valve at D to keep out the air.

Before we conclude the subject of steam-engines, we shall add a most curious and useful table of the calculation of the power of the lever-engines, for the various diameters of the cylinder, or steam-barrel, and bore of the pump that are capable of raising water from 48 to 440 hogheads *per* hour, at any depth from 15 to 100 yards. It was composed by Henry Beighton, and is founded on this principle, that the ale-gallon of 282 cubic inches of water weighs 10lb. 33. averdupois, and a superficial square inch is pressed with the weight of 14lb 133 of air, when the mercury stands at a medium in the barometer. But allowing for several frictions, and to give a considerable velocity to the engine, it is found by experience that no more than 8lb of pressure must be allowed to an inch square on the piston in the cylinder, that it may make about sixteen strokes in a minute at about six feet to each stroke. This calculation is but the ordinary power in practice, for with large boilers the piston will make twenty or twenty-five *per* minute, and each of them seven or eight feet; and then a pump of nine inches bore will discharge more than 320 hogheads *per* hour, and for other sizes proportionably.

Table

Table shewing the Diameter of the Cylinder and Bore of the Pump that is capable of raising any Quantity of Water, from 48 to 440 Hogheads an Hour, at any Depth from 15 to 100 Yards.

The depths in yards.												
15	20	25	30	35	40	45	50	60	70	80	90	100
18 $\frac{1}{2}$	21 $\frac{1}{2}$	24	26 $\frac{1}{2}$	28 $\frac{1}{2}$	30 $\frac{1}{2}$	32 $\frac{1}{2}$	34 $\frac{1}{2}$	37 $\frac{1}{2}$	40	43 $\frac{1}{2}$	47 $\frac{1}{2}$	51 $\frac{1}{2}$
17	19 $\frac{1}{2}$	22	24 $\frac{1}{2}$	26 $\frac{1}{2}$	28 $\frac{1}{2}$	29 $\frac{1}{2}$	31 $\frac{1}{2}$	34 $\frac{1}{2}$	37	40 $\frac{1}{2}$	44 $\frac{1}{2}$	48 $\frac{1}{2}$
15 $\frac{1}{2}$	18	20	22	23 $\frac{1}{2}$	25 $\frac{1}{2}$	27	28 $\frac{1}{2}$	31 $\frac{1}{2}$	33 $\frac{1}{2}$	36	39 $\frac{1}{2}$	42 $\frac{1}{2}$
14	16 $\frac{1}{2}$	18	20	21 $\frac{1}{2}$	23	24 $\frac{1}{2}$	25 $\frac{1}{2}$	28	30 $\frac{1}{2}$	33 $\frac{1}{2}$	36 $\frac{1}{2}$	39 $\frac{1}{2}$
13 $\frac{1}{2}$	15 $\frac{1}{2}$	17 $\frac{1}{2}$	19	20 $\frac{1}{2}$	21 $\frac{1}{2}$	23	24	26 $\frac{1}{2}$	28 $\frac{1}{2}$	31	34 $\frac{1}{2}$	37 $\frac{1}{2}$
12 $\frac{1}{2}$	14 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{1}{2}$	19	20 $\frac{1}{2}$	21 $\frac{1}{2}$	22 $\frac{1}{2}$	24 $\frac{1}{2}$	26 $\frac{1}{2}$	28 $\frac{1}{2}$	30 $\frac{1}{2}$	32 $\frac{1}{2}$
12	14	15 $\frac{1}{2}$	17 $\frac{1}{2}$	18 $\frac{1}{2}$	19 $\frac{1}{2}$	20 $\frac{1}{2}$	21	22 $\frac{1}{2}$	24 $\frac{1}{2}$	25 $\frac{1}{2}$	27	29
11 $\frac{1}{2}$	13 $\frac{1}{2}$	15	16 $\frac{1}{2}$	18	19	20	21 $\frac{1}{2}$	23 $\frac{1}{2}$	25	27	28 $\frac{1}{2}$	30 $\frac{1}{2}$
11	13	14	15 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{1}{2}$	19	20 $\frac{1}{2}$	22 $\frac{1}{2}$	24	25 $\frac{1}{2}$	27	28 $\frac{1}{2}$
10 $\frac{1}{2}$	12 $\frac{1}{2}$	13 $\frac{1}{2}$	14	15 $\frac{1}{2}$	16 $\frac{1}{2}$	18	19	20 $\frac{1}{2}$	22	23	24 $\frac{1}{2}$	26 $\frac{1}{2}$
10	12	13	14	15	16 $\frac{1}{2}$	17	18	19	20 $\frac{1}{2}$	22	23	24 $\frac{1}{2}$
9 $\frac{1}{2}$	11 $\frac{1}{2}$	12	13	14	15 $\frac{1}{2}$	16	17	18	19	20 $\frac{1}{2}$	22	23
9	11	12	13	14	15	16	17	18	19	20 $\frac{1}{2}$	22	23
8 $\frac{1}{2}$	10 $\frac{1}{2}$	11	12	13	14	15	16	17	18	19	20 $\frac{1}{2}$	22
8	10	11	12	13	14	15	16	17	18	19	20 $\frac{1}{2}$	22
7 $\frac{1}{2}$	9 $\frac{1}{2}$	10	11	12	13	14	15	16	17	18	19	20 $\frac{1}{2}$
7	9	10	11	12	13	14	15	16	17	18	19	20 $\frac{1}{2}$
6 $\frac{1}{2}$	8 $\frac{1}{2}$	9	10	11	12	13	14	15	16	17	18	19
6	8	9	10	11	12	13	14	15	16	17	18	19
5 $\frac{1}{2}$	7 $\frac{1}{2}$	8	9	10	11	12	13	14	15	16	17	18
5	7	8	9	10	11	12	13	14	15	16	17	18
4 $\frac{1}{2}$	6 $\frac{1}{2}$	7	8	9	10	11	12	13	14	15	16	17
4	6	7	8	9	10	11	12	13	14	15	16	17

in one hour.		gall.		Diameter of the cylinder in inches.	
63 gal. to a hoghead.	hhd.	hhd.	gall.	hhd.	gall.
7	21	440	3	11	48
6	20	369	3	11	48
5	5	304	48	11	48
4	7	247	7	11	48
3	43	221	15	11	48
3	16	195	22	11	48
2	2	182	13	11	48
2	55	172	30	11	48
2	31	149	40	11	48
2	9	128	54	11	48
1	52	110	1	11	48
1	36	94	30	11	48
1	7	66	61	11	48
1	1	60	60	11	48
0	51	48	51	11	48

at 16 strokes a minute.		gallons		weight in one yard.	
gallons	hhd.	gallons	hhd.	gallons	hhd.
462.	146.	28.8	14.4	12.13	10
338.	123.5	24.	12.13	10.02	10
320.	102.	16.2	8.12	10.02	10
259.8	82.7	14.5	7.26	10.02	10
232.3	73.9	12.8	6.41	10.02	10
205.2	65.3	12.2	6.01	10.02	10
192.3	61.2	11.3	5.66	10.02	10
181.1	57.6	10.8	5.31	10.02	10
157.1	50.0	9.8	4.91	10.02	10
135.3	43.0	8.4	4.23	10.02	10
115.5	36.7	7.2	3.61	10.02	10
99.2	31.8	6.2	3.13	10.02	10
80.3	25.5	5.0	2.51	10.02	10
64.6	20.5	2.4	2.02	10.02	10
51.2	16.2	3.2	1.6	10.02	10

An example of the use of the table. Suppose it were required to draw 150 hogheads per hour, at 90 yards deep: in the seventh column I find the nearest number 149 hogheads; and against it, in the first column, I find a seven inch bore; then, under 90, the depth, on the right in the same line, I have 27 inches, the diameter of the cylinder fit for that purpose: and so for any other.

**Water-ENGINES**, those made for raising water: such is the steam-engine, already described. See also **WATER-WORKS**, where several curious engines of this kind, moved by water, will be described.

**ENGINEER**, or **ENGINEER**, properly denotes a contriver, or maker, of engines. See the preceding article.

**ENGINEER**, in the military art, an able, expert man, who, by a perfect knowledge in mathematics, delineates upon paper, or marks upon the ground, all forts of forts, and other works proper for offence and defence. He should understand the art of fortification, so as to be able, not only to discover the defects of a place, but to find a remedy proper for them, as also how to make an attack upon, as well as to defend, the place. Engineers are extremely necessary

cellary

cessary for these purposes : wherefore it is requisite that, besides being ingenious, they should be brave in proportion. When at a siege the engineers have narrowly surveyed the place, they are to make their report to the general, by acquainting him which part they judge the weakest, and where approaches may be made with most success. Their business is also to delineate the lines of circumvallation and contravallation, taking all the advantages of the ground ; to mark out the trenches, places of arms, batteries, and lodgments, taking care that none of their works be flanked or discovered from the place. After making a faithful report to the general of what is a doing, the engineers are to demand a sufficient number of workmen and utensils, and whatever else is necessary.

**ENGLAND**, the southern division of Great Britain, situated in the Atlantic ocean, between  $2^{\circ}$  east and  $6^{\circ}$  west longitude, and between  $49^{\circ} 55'$  and  $55^{\circ} 55'$  north latitude.

There are in England, including Wales, fifty-two counties, two archbishoprics, twenty-four bishoprics, two universities, twenty-nine cities, upwards of eight hundred towns, and near ten thousand parishes ; supposed to contain about 7,000,000 of people.

As to the polity, trade, law, civil and religious antiquities, &c. of England, their several branches are treated of under the articles **PARLIAMENT**, **PRIVY COUNCIL**, **COURT**, **CUSTOM-HOUSE**, **ADMIRALTY**, &c.

**New-ENGLAND**, comprehending the colonies of Massachusetts, New Hampshire, Connecticut, Rhode-island, and Providence Plantation, is situated between  $67^{\circ}$  and  $73^{\circ}$  west longitude, and between  $41^{\circ}$  and  $45^{\circ}$  north latitude.

The provinces into which New England is divided, have different constitutions, and generally different governors, who have a negative voice in the choice of the members who are to serve as their council ; and besides, all laws must be sent to Old England to receive the approbation of the crown, and no act of government is valid without the governor's consent in writing.

**ENGLECE**RIE, **ENGLESHIRE**, or **ENGLISHERY**, an antient word signifying the being an englishman, which was used in the time of king Canutus, to distinguish the English from the Danes, especially in the case of murder, and its

punishment ; as where a person was privately killed, such a person was deemed francigena, which comprehended every alien, till englecery was proved ; that is to say, till he was made out to be an englishman, in which case the town, &c. wherein it was committed, was exempted from amercement, which it was liable to if the murderer of a dane escaped out of it unpunished. The manner of proving the party slain to be an englishman, was before the coroner, by two men that knew his father, and two women that knew his mother. This was taken away by statute 14 Ed. III. c. 4.

**ENGLISH**, or the **ENGLISH-TONGUE**, the language spoken by the people of England, and, with some variation, by those of Scotland, as well as part of Ireland, and the rest of the british dominions.

The antient language of Britain is generally allowed to have been the same with the gaulic, or french ; this island, in all probability, having been first peopled from Gallia, as both Cæsar and Tacitus affirm, and prove by many strong and conclusive arguments, as by their religion, manners, customs, and the nearness of their situation. But now we have very small remains of the antient british tongue, except in Wales, Cornwall, the islands and highlands of Scotland, part of Ireland, and some provinces of France ; which will not appear strange, when what follows is considered.

Julius Cæsar, some time before the birth of our Saviour, made a descent upon Britain, though he may be said rather to have discovered than conquered it ; but, about the year of Christ forty-five, in the time of Claudius, Aulus Plautius was sent over with some roman forces, by whom two kings of the Britons, Codigunus and Caractacus, were both overcome in battle : whereupon a roman Colony was planted at Malden in Essex, and the southern parts of the island were reduced to the form of a roman province : after that, the island was conquered as far north as the Firths of Dumbarton and Edinburgh, by Agricola, in the time of Domitian ; whereupon, a great number of the Britons, in the conquered part of the island, retired to the west part called Wales, carrying their language with them.

The greatest part of Britain being thus become a roman province, the roman legions,



legions, who resided in Britain for above two hundred years, undoubtedly disseminated the latin tongue; and the people being afterwards governed by laws written in Latin, must necessarily make a mixture of languages. This seems to have been the first mutation the language of Britain suffered.

Thus the british tongue continued, for some time, mixed with the provincial latin, till, the roman legions being called home, the Scots and Picts took the opportunity to attack and harass England: upon which, K. Vortigen, about the year 440, called the Saxons to his assistance, who came over with several of their neighbours, and having repulsed the Scots and Picts, were rewarded for their services with the isle of Thanet, and the whole county of Kent: but growing too powerful, and not being contented with their allotment, dispossessed the inhabitants of all the country on this side of the Severn: thus the british tongue was in a great measure destroyed, and the Saxon introduced in its stead.

What the saxon tongue was long before the conquest, about the year 700, we may observe in the most ancient manuscripts of that language, which is a gloss on the Evangelists, by bishop Edfrid, in which the three first articles of the Lord's prayer run thus.

" Uren fader thic arth in heofnas, sic  
 " gehalgud thin noma, so cymeth thin  
 " ric. Sic thin willa sue is heofnas, and  
 " in eorþho, &c."

In the beginning of the ninth century, the Danes invaded England, and getting a footing in the northern and eastern parts of the country, their power gradually increased, and they became sole masters of it in about two hundred years. By this means the antient british obtained a tincture of the danish language: but their government, being of no long continuance, did not make so great an alteration in the Anglo-saxon, as the next revolution, when the whole land, *A. D.* 1067, was subdued by William the Conqueror, duke of Normandy in France: for the Normans, as a monument of their conquest, endeavoured to make their language as generally received as their commands, and thereby rendered the british language an entire medley.

About the year 900, the Lord's prayer in the antient Anglo-saxon, ran thus:

" Thu ure fader the eart on heofenum,  
 " si thin nama gehalgod; cume thin  
 " rice si thin willa on eorþan swa, swa  
 " on heofenum, &c."

About the year 1160, under Hen. II. it was rendered thus by pope Adrian, an englishman, in rhyme:

" Ure fader in heaven rich,  
 " Thy name be hayled ever lich,  
 " Thou bring us thy michell blisse:  
 " Als hit in heaven y-doe  
 " Evar in yearth beene it also, &c."

Dr. Hicks gives us an extraordinary specimen of the english, as spoken in the year 1385, upon the very subject of the english tongue.

" As it is knowe how meny maner  
 " peple beeth in this lond; there beeth  
 " also so many dyvers longages and  
 " tonges. Notheles Walschemen and  
 " Scots that beeth nought medled with  
 " other nations, holdeth wel nyh hir  
 " firste longage and speche; but yif the  
 " Scottes that were sometime confederat  
 " and woned with the picles drawe  
 " somewhat after hir speche; but the  
 " Flemynge that woneth on the weste  
 " side of Wales, haveth lost her strange  
 " spech and speketh sexonliche now.  
 " Also englihemmen, they had from  
 " the bygynnyng thre maner speche:  
 " northerne, southerne, and middel  
 " speche in the middel of the lond, as  
 " they come of thre maner of peple of  
 " Germania: notheles by comyxtion  
 " and mellynge first with Danes, and  
 " afterwards with Normans in meny  
 " the contrary longage is apayred.  
 " (corrupted.)

" This apayrynge of the burthe of the  
 " tunge is bycause of tweie thinges;  
 " oon is for children in scole agenft  
 " the usiuge and maner of all other  
 " nations, beeth compelled for to leve  
 " hire own longage, and for to con-  
 " stitue hir lessons and here thynges in  
 " French, and so they haveth sethe Nor-  
 " mans come first into Engeland. Also  
 " gentlemen children beeth taught to  
 " speke Frensche from the tyme that  
 " they beeth rokked in here cradel, and  
 " kunneth speke and play with a childes  
 " broche; and uplondische men will  
 " lykne hymself to gentilmen, and  
 " fondeth with great besynesse for to  
 " speake Frensche to be told of.---Hit  
 " seemeth a greet wonder how englishe-  
 " men and her own longage and tonge  
 " is so dyverse of sown in this oon  
 " ilond; and the longage of Nor-  
 " mandie

"mandie is comlynge of another lond,  
 "and hath oon manner foun amonge.  
 "alle men that speketh hit ariht in  
 "Engelond. Also of the foresaid  
 "saxon tonge that is deled (divided) a  
 "three, and is abide scarceliche with  
 "fewe uplondische men is greet wonder.  
 "For men of the est, with men of the  
 "west, is, as it were, undir the same  
 "partie of hevne acordeth more in  
 "townynge of speche, than men of the  
 "north, with men of the south. There-  
 "fore it is that mercii, that beeth men  
 "of myddel Engelond, as it were, par-  
 "teners of the endes, underfondeth  
 "bette the side longages northerne, and  
 "southerne, than northerne or southerne  
 "underfondeth either other. --- All the  
 "longage of the Northumbers and  
 "spechialliche at York, is so scharp,  
 "slitting and frotynge, and unshape,  
 "that we southerne men may that  
 "longage unnethe underfonde, &c.

"*Hicks's Thesaur. liter. sept.*"

In the year 1537, the Lord's prayer was printed as follows: "O. oure father  
 "which arte in heven, halowed be thy  
 "name: let thy kingdome come, thy  
 "will be fulfilled as well in erth as it  
 "is in heven; geve us this daye in  
 "dayly bred, &c." Where it may be  
 observed that the diction is brought al-  
 most to the present standard, the chief  
 variations being only in the orthography.  
 By these instances, and many others  
 that might be given, it appears, that the  
 english saxon language, of which the  
 Normans despoiled us in a great measure,  
 had its beauties, was significant and em-  
 phatical, and preferable to what they  
 imposed on us. "Great, verily," says  
 Camden, "was the glory of our tongue,  
 "before the norman conquest, in this,  
 "that the old english could expresse,  
 "most aptly, all the conceptions of the  
 "mind in their own tongue, without  
 "borrowing from any." Of this he  
 gives several examples.

Having thus shewn how the antient  
 british language was, in a manner, ex-  
 tirpated by the Romans, Danes, and  
 Saxons, and succeeded by the Saxon, and  
 after that the Saxon blended with the  
 Norman French, we shall now mention  
 two other causes of change in the lan-  
 guage: the first of these is owing to the  
 Britains having been a long time a trading  
 nation, whereby offices, dignities, names  
 of wares, and terms of traffic are in-  
 troduced, which we take with the

wares from the persons of whom we  
 have them, and form them anew, ac-  
 cording to the genius of our own tongue;  
 and besides this change in the language,  
 arising from commerce, Britain's having  
 been a considerable time subject to the  
 see of Rome, in ecclesiastical affairs,  
 must unavoidably introduce some italian  
 words among us. Secondly, as to the  
 particular properties of a language, our  
 tongue, has undergone no small muta-  
 tion, or rather has received no small im-  
 provement upon that account: for, as  
 to the Greek and Latin, the learned have,  
 together with the arts and sciences, now  
 rendered familiar among us, introduced  
 abundance; nay almost all the terms of  
 art in the mathematics, philosophy, phy-  
 sic, and anatomy; and we have enter-  
 tained many more from the Latin,  
 French, &c. for the sake of neatness and  
 elegance: so that, at this day, our  
 language, which about 1800 years ago,  
 was the antient British, or Welch, &c.  
 is now a mixture of Saxon, Teutonic,  
 Dutch, Danish, Norman, and modern  
 French, embellished with the Greek and  
 Latin. Yet this, in our opinion, is so  
 far from being a disadvantage to the  
 english tongue, as now spoke (for all  
 languages have undergone changes, and  
 do continually participate with each  
 other) that it has so enriched it, as now  
 to become the most copious, significant,  
 fluent, courteous, amorous and masculine  
 language in Europe, if not in the  
 world: This, indeed, was Camden's  
 opinion of it in his time, and Dr.  
 Heylin's in his time: if then the english  
 tongue, in the opinion of these learned  
 authors, deserved such a character in their  
 days, how much more now, having  
 since received so considerable improve-  
 ments from so many celebrated writers.

**ENGONASIS**, a name given to the con-  
 stellation Hercules. See **HERCULES**.

**ENGRAFTING**, or **GRAFTING**, in gar-  
 dening. See the article **GRAFTING**.

**ENGRAILED**, or **INGRAILED**, in he-  
 raldry, a term derived from the french  
*greffy*, hail; and signifying a thing the  
 hail has fallen upon and broke off the  
 edges, leaving them ragged, or with  
 half rounds, or semicircles, struck out of  
 their edges.

**ENGRAVING**, the art of cutting metals  
 and precious stones, and representing  
 thereon figures, letters, or whatever de-  
 vice, or design, the artist fancies.

Engraving, properly a branch of sculp-  
 ture,

ture, is divided into several other branches, according to the matter whereon it is employed, and the manner of performing it. See the article *SCULPTURE*. The original way of engraving on wood is denominatèd, at present, with us, by cutting in wood; that on metals with aquafortis, is named etching; that by the knife, burnisher, punch, and scraper, is called mezzotinto; that on stones for tombs, &c. stone-cutting; and that performed with the graver, on metals or precious stones, keeps alone the primitive name of engraving, being that which we shall at present attend to. See the articles *CUTTING*, *ETCHING*, *MEZZO-TINTO*, and *STONE-CUTTING*.

*ENGRAVING on copper*, is employed in representing portraits, histories, landkips, foliages, figures, buildings, &c. either after paintings, or designs, for that purpose. See *DESIGN* and *PAINTING*.

It is performed with the graver on a plate of copper, which, being well polished, is covered over thinly with virgin-wax, and then smoothed, while warm, with a feather, so that the wax be of an equal thickness on the plate; and on this the draught or design, done in black lead, red chalk, or ungummed ink, is laid with the face of the drawing on the wax: then they rub the backside, which will cause the whole design of the drawing to appear on the wax. The design, thus transferred, is traced through on the copper, with a point, or needle; then heating the plate, and taking off the wax, the strokes remain to be followed, heightened, &c. according to the tenor of the design, with the graver, which must be very sharp, and well pointed. See the article *GRAVER*.

In the conduct of the graver consists almost all the art, which depends not so much upon rules as upon practice, the habitude, disposition, and genius of the artist, the principles of engraving being the same with those of painting; for if an engraver be not a perfect master of design, he can never hope to arrive at a degree of perfection in this art. In conducting the strokes, or cuts, of the graver, he must observe the action of the fingers, and of all their parts, with their outlines; and remark how they advance towards, or fall back from his sight, and then, conduct his graver, according to the risings or cavities of the muscles, or folds, widening the strokes in the light, and contrasting them in the shades;

as also at the extremity of the outlines, to which he ought to conduct the cuts of the graver, that the figures or objects represented, may not appear as if they gnawn; and lightening his hand, that the outlines may be perfectly sound, without appearing cut or slit; and, although his strokes necessarily break off where a muscle begins, yet they ought always to have a certain connection with each other, so that the first stroke should often serve to make the second, because this will shew the freedom of the graver.

If hair be the subject, let the engraver begin his work by making the outlines of the principal locks, and sketch them out in a careless manner, which may be finished, at leisure, with finer and thinner strokes to the very extremities.

The engraver must avoid making very acute angles, especially in representing flesh, when he crosses the first strokes with the second, because it will form a very disagreeable piece of tabby-like lattice-work, except in the representation of some clouds, in tempests, the waves of the sea, and in representations of skins of hairy animals, and leaves of trees. So that the medium between square and acute seems to be the best and most agreeable to the eye. He that would represent sculpture, must remember that, as statues, &c. are most commonly made of white marble, or stone, whose colour does not produce such dark shades as other matters do, have no black to their eyes, nor hair of the head, and beard flying in the air. If the engraver would preserve one quality and harmony in his works, he should always sketch out the principal objects of his piece before any part of them are finished.

The instruments necessary for this sort of engraving are, besides a graver, a cushion, or sand bag, made of leather, to lay the plate on, in order to give it the necessary turns and motions; a burnisher made of iron, or steel, round at one end, and usually flattish at the other, to rub out slips and failures, soften the strokes, &c. a scraper, to pare off the surface, on occasion; and a rubber of a black hat, or cloth rolled up, to fill up the strokes that they may appear the more visible.

*In engraving on precious stones*, they use either the diamond, or the emery. The diamond, which is the hardest of all stones,

stones, is only cut by itself, or with its own matter. The first thing to be done in this branch of engraving, is to cement two rough diamonds to the ends of two ticks big enough to hold them steady in the hand, and to rub or grind them, against each other, till they be brought to the form desired. The dust, or powder that is rubbed off serves afterwards to polish them, which is performed with a kind of mill that turns a wheel of soft iron. The diamond is fixed in a brass-dish, and, thus applied to the wheel, is covered with diamond-dust, mixt up with oil of olives; and when the diamond is to be cut facet-wise, they apply first one face, then another, to the wheel. Rubies, sapphires, and topazes, are cut and formed the same way on a copper wheel, and polished with tripoli diluted in water. As to agates, amethysts, emeralds, hyacinths, granates, rubies, and others of the softer stones, they are cut on a leaden wheel, moistened with emery and water, and polished with tripoli, on a pewter wheel. Lapis-lazuli, opal, &c. are polished on a wooden wheel. To fashion and engrave vases of agate, crystal, lapis-lazuli, or the like, they make use of a kind of lathe, like that used by pewterers to hold the vessels, which are to be wrought with proper tools; that of the engraver generally holds the tools, which are turned by a wheel; and the vessel is held to them to be cut and engraved, either in relieve or otherwise; the tools being moistened, from time to time, with diamond-dust and oil; or, at least, emery and water. To engrave figures or devices on any of these stones, when polished, such as medals, seals, &c. they use a little iron wheel, the ends of whose axis are received within two pieces of iron, placed upright, as in the turner's lathe; and to be brought closer, or set further apart, at pleasure: at one end of the axis are fitted the proper tools, being kept tight by a screw. Lastly, the wheel is turned by the foot, and the stone applied by the hand to the tool, and is shifted and conducted as occasion requires.

The tools are generally of iron, and sometimes of brass: their form is various, but it generally bears some resemblance to chisels, gouges, &c. Some have small round heads, like buttons, others like ferrels, to take the pieces out, and others flat, &c. when the stone has been en-

graven, it is polished on wheels of hair-brushes and tripoli.

ENGRAVING *on steel* is chiefly employed in cutting seals, punches, matrices, and dyes proper for striking coins, medals, and counters. The method of engraving with the instruments, &c. is the same for coins as for medals and counters: All the difference consists in their greater or less relieve, the relieve of coins being much less considerable than that of medals, and that of counters still less than that of coins.

Engravers in steel commonly begin with punches, which are in relieve, and serve for making the creux, or cavities, of the matrices, and dyes: though sometimes they begin with the creux, or hollowness, but then it is only when the intended work is to be cut very shallow. The first thing done, is that of designing the figures; the next is the moulding them in wax, of the size and depth they are to lie, and from this wax the punch is engraven. When the punch is finished they give it a very high temper, that it may the better bear the blows of the hammer with which it is struck to give the impression to the matrix. See the articles PUNCH and MATRIX.

The steel is made hot to soften it, that it may the more readily take the impression of the punch; and after striking the punch on it, in this state, they proceed to touch up or finish the strokes and lines, where, by reason of their fineness, or the too great relieve, they are any thing defective, with steel gravers of different kinds, chisels, flatters, &c. being the principal instruments used in graving on steel.

The figure being thus finished, they proceed to engrave the rest of the medal, as the mouldings of the border, the engrailed ring, letters, &c. with little steel punches, well tempered, and very sharp.

ENGRAULIS, in ichthyology, a name given to the anchovy. See ANCHOVY.

ENGROSSING, or INGROSSING. See the articles INGROSSER and INGROSSING.

ENGUCHE, in heraldry, is said of the great mouth of a hunting horn, when its rim is of a different colour from that of the horn itself.

ENGYSCOPE, the same with microscope. See the article MICROSCOPE.

ENHARMONIC, in the antient music, one of their genera or kinds of music, so called from its superior excellence; tho' wherein it consisted, says Mr. Malcom,

is hard to say: it was allowed by all to be so very difficult, that few could ever practise it.

Others say it is a species of music, the modulation whereof proceeds by intervals less than semitones; as the semitone minor, enharmonic diesis, and third major. See SEMITONE, DIESIS, and THIRD.

This genus, says Brossard, was greatly used in the greek music, especially in dramatic performances. But as those almost insensible elevations and fallings of the voice, whereof it consists, are too difficult, and as they sometimes make the concord false, it has been laid aside, and even lost, though several great authors have made many attempts to recover it. See the articles GENUS, INTERVAL, and SYSTEM.

ENHERITANCE, or INHERITANCE. See the article INHERITANCE.

ENHYDRUS, in natural history, a genus of siderochita or crustated ferrugineous bodies, formed in large and in great part empty cases, inclosing a small quantity of an aqueous fluid.

Of this genus there are only two species.

1. The thick-shelled enhydrus, with black, reddish-brown, and yellow crusts.
2. The thinner-shelled kind, with yellowish-brown, and purple crusts; neither of which ferments with aqua fortis, or gives fire with steel.

ENIGMA, or ÆNIGMA. See the article ÆNIGMA.

ENIXUM, among chemists, a kind of neutral salt, generated of an acid and an alkali.

The sal enixum of Paracelsus, is the caput mortuum of spirits of nitre with oil of vitriol, or what remains in the retort after the distillation of this spirit; being of a white colour, and pleasing acid taste. If this be dissolved in hot water, and crystallized, it will be a yet more pleasant medicine, agreeing in virtues with vitriolated tartar. It is diuretic, and may be given from a scruple to a dram, in broth or water-gruel.

ENLARGE, in the manege, is to make a horse go large, or embrace more ground than he before covered.

To this purpose you should prick with both heels, or aid him with the calves of the legs, and bear your hand outwards; or rather prick him with the inner heel, sustaining him with the outer leg, in order to press him forwards, and make his shoulders go.

ENMANCHE', in heraldry, is when lines are drawn from the center of the upper edge of the chief to the sides, to about half the breadth of the chief; signifying sleeved, or resembling a sleeve, from the french *manche*.

ENNEACTIS, in natural history, a species of star-fish, with nine rays. See the article STAR-FISH.

ENNEADECATERIS, in chronology, the name by which the Greeks called the lunar cycle of nineteen years. See the article CYCLE.

ENNEAGON, in geometry, a polygon with nine sides. See the article POLYGON.

ENNEAHEDRIA, in natural-history, a genus of columnar, crystalliform, and double-pointed spars, composed of a trigonal column, terminated at each end by a trigonal pyramid.

Of this genus there are several species, distinguished by the length or shortness of the column and pyramids, none of which will give fire with steel, but all of them ferment with aqua-fortis. See the article SPAR.

ENNEANDRIA, in botany, a class of plants with hermaphrodite flowers, and nine stamina or male parts in each. See the article BOTANY.

To this class belong the laurus, rheum, spondias, and butomus. See the articles LAURUS, &c.

ENNEOPHTHALMUS, a name used by some for the lamprey.

ENNERIS, in the naval architecture of the antients, a galley or vessel with nine tires of oars. See the article GALLEY.

ENORAINE, in the manege, denotes a wither-wrung horse, or one spoiled in the withers. See the article WITHERS.

ENORCHIS, a species of ætites, wherein the nucleus is fixed. See ÆTITES.

ENQUEST, or INQUEST, in law. See the article INQUEST.

ENRICHED and ENRICHING. See the articles INRICHED and INRICHING.

ENROLLMENT, and clerk of ENROLLMENTS, &c. See INROLLMENT and CLERK.

ENS, among metaphysicians, denotes entity, being, or existence: thus the schools call *ens reale*, and *ens positivum*, to distinguish it from their *ens rationis*, which is only an imaginary thing, or exists only in the imagination.

ENS, among chemists, imports the power, virtue, and efficacy which certain substances exert upon our bodies. Pa-

cellus speaks much of the *ens primum* of minerals, gems, herbs, and liquors ; by which he means, the parts in which their virtues reside, or the very virtue or efficacy itself. Authors relate wonders of the renovating power of the *ens primum* of baum, and other plants, which is different in each kind.

**ENS VENERIS**, the sublimate of equal quantities of dulcified calx of vitriol, and the dried flowers of sal ammoniac, a small proportion of which turns a large one of the infusion of galls black : it is red, saline, and astringent ; and said to be an excellent medicine in distempers arising from a weakness of the solids, as the rickets, and the like.

**ENS**, in geography, a city of Germany, situated at the confluence of the Danube and the river Ens, about eighty miles south of Vienna : east long.  $14^{\circ} 20'$ , north lat.  $48^{\circ} 16'$ .

**ENSAL**, a term used by some for the small cardamom of the shops.

**ENSCONCED**, or **INSCONCED**. See the article **INSCONCED**.

**ENSEELED**, in falconry, is said of a hawk that has a thread drawn through her upper eye-lid, and made fast under her beak, to take away the sight.

**ENSIENT**, and **ENSIENTURE**, among lawyers, signifies a woman's being pregnant, or with child. See the article **PREGNANCY**.

**ENSIFORM**, in general, something resembling a sword, *ensis* : thus we find mention of ensiform leaves, ensiform cartilage, &c. See **LEAF** and **XIPHOIDES**.

**ENSIGN**, in the military art, a banner under which the soldiers are ranged according to the different companies or parties they belong to. See the articles **COLOURS**, **FLAG**, **STANDARD**, &c.

The european ensigns are pieces of taffety with various figures, arms, and devices painted on them, in different colours : the turkish ensigns are horses-tails.

**ENSIGN** is also the officer that carries the colours, being the lowest commissioned officer in a company of foot, subordinate to the captain and lieutenant. It is a very honourable and proper post for a young gentleman, at his first coming into the army : he is to carry the colours both in assault, day of battle, &c. and should not quit them but with his life : he is always to carry them himself on his left shoulder : only on a march he may have them carried by a soldier. If the ensign

is killed, then the captain is to carry the colours in his stead.

**ENSISHEIM**, a town of Germany, in the langraviate of Alsace, about fifty miles south of Straßburg : east long.  $7^{\circ} 30'$ , north lat.  $47^{\circ} 50'$ .

**ENSKIRKEN**, a town of Germany, fifteen miles south-west of Cologn.

**ENTABLATURE**, or **ENTABLEMENT**, in architecture, is that part of an order of a column, which is over the capital, and comprehends the architrave, frieze, and cornice.

The entablature is also called the *trabeation*, and seems borrowed from the latin, *trabs*, a beam ; though others derive it from *tabulatum*, a ceiling, because the frieze is supposed to be formed by the ends of the joists which bear upon the architrave.

It is different in different orders ; for notwithstanding that it consists of the three above-mentioned divisions in all, yet these parts are made up of more or fewer particular members or subdivisions, according as the order is more or less rich. Vignola makes the entablature a quarter of the height of the whole column in all the orders. In the tuscan and doric, the architrave, frieze, and cornice, are all of the same height. In the ionic, corinthian, and composite, the whole entablature being of fifteen parts, five of these go to the architrave, four to the frieze, and six to the cornice. See the articles **TUSCAN**, **DORIC**, &c.

Mr. le Clerc observes, that were we to regard only the laws of strength and weakness, we should rather diminish the entablature of such columns as have pedestals, than those which have none. As to the projecture of the entablature, it should never be forgot, that its principal design is to shelter what is underneath.

**ENTABLATURE**, in masonry, is used sometimes to denote the last row of stones on the top of the wall of a building, on which the timber and covering rest. This is often made to project beyond the naked of the wall, to carry off the rain.

**ENTABLER**, in the manege, the fault of a horse whose croupe goes before his shoulders in working upon volts ; which may be prevented by taking hold of the right rein, keeping your right leg near, and removing your left leg as far from the horse's shoulder as possible.

This is always accompanied with another fault called *aculer*. See **ACULER**.

**ENTAIL**,

**ENTAIL**, in law, is a fee-estate intailed ; that is, abridged and limited to certain conditions prescribed by the donor or grantor. See the articles **FEE**, **RECOVERY**, and **TAIL**.

**ENTALIUM**, a name used by some for the dentalium. See **DENTALIUM**.

**ENTE**, in heraldry, a method of marshalling more frequent abroad than with us, and signifying grafted or ingrafted.

We have, indeed, one instance of ente in the fourth grand quarter of his majesty's royal ensign, whose blazon is Brunswick and Lunenburg impaled with ancient Saxony, *ente en pointe*, grafted in point.

**ENTELECHIA**, *ἐντελέχεια*, a word used by Aristotle to express the soul, and which, not occurring in any other author, has given the commentators upon that philosopher great trouble to discover its true meaning. See the article **SOUL**. Hemolaus Barbarus is even said to have consulted the devil about it, after which, in his paraphrase on Themistius, either from the devil or himself, renders it *perfectibilia*, which is nothing clearer.

Cicero, whose interpretation of this word should be esteemed preferable to that of any modern writer, defines *entelechia* *quædam quasi continuata & perennis motio*, a certain continued and perpetual motion : whence it would appear, that Aristotle took the soul for a mode of the body, a continuous and perpetual motion being undoubtedly a mode of body. The vulgar peripatetics hold *entelechia* to signify act, and under it suppose the form of the compound or animal to be understood. The latest peripatetics agree, that the act, or *entelechia*, whereby Aristotle meant to explain the nature of the soul, is either some mode of the body, or it is nothing at all.

*Chauvin*,

**ENTENDMENT**, or **INTENDMENT**, in law. See the article **INTENDMENT**.

**ENTERFERING**, in the manege, the same with cutting. See **CUTTING**.

**ENTERING** of a *hawk*, among sportsmen, the letting her kill for the first time.

**ENTERING** of *hounds*, is the instructing them how to hunt. See **ENTRANCE**.

**ENTERMEWER**, in falconry, a hawk that changes the colour of her wings by degrees. See the article **HAWK**.

**ENTEROCELE**, *επηρεκηλη*, in surgery, a tumor formed by a prolapsion of the intestines through the rings of the abdo-

men, and processes of the peritonæum, into the scrotum. It is sometimes termed an *oscheocele* and complete *hernia*, in contradistinction to the *bubonocèle*. See the article **BUBONOCELE**, &c.

This disorder arises from a violent distention of the peritonæum and rings of the abdominal muscles, through which the intestine prolapses into the scrotum ; and proceeds from some violence by a fall, blow, or straining to leap, lift up great weights, vomiting, &c. and according to the nature of the cause, the rupture is formed either instantly or imperceptibly by degrees. This rupture is always attended with pains, and usually happens but in one side, never in both at a time : sometimes the intestine alone falls down ; at other times, it is accompanied with the omentum. The tumor appears soft to the touch like an intestine, or bladder, distended with wind : it first appears small in the inguen, and gradually descends down to the testicle of the same side in the scrotum, which is thereby sometimes distended halfway down the thigh, and even down to the knee : the other symptoms are the same with those of the *bubonocèle*.

The tumor is increased by crying, plentiful eating, lifting, or carrying any burden ; is contracted with cold, and dilated with heat : it may be distinguished generally from the *hydrocele* or *pneumatocèle*, by its returning into the abdomen with a murmuring noise.

This kind of rupture may be sustained with but little inconveniencies by men not much addicted to hard labour, and women with child ; but it should never be left to itself without a support or truss, lest, by some accident, the intestines should become incarcerated, and incapable of being returned. When the disorder is recent, and in a young subject, it may be perfectly cured without danger of a relapse ; as it may also in adults and old people, by constantly wearing a proper truss. It is less dangerous when the intestine is attended with the omentum. When the intestine is returnable, the surgeon should immediately reduce the parts, and retain them in their proper situation, and to close up the aperture firmly with a truss, bandage, or by incision, termed *celotomy*.

Another method consists chiefly in passing a small gold-wire round the upper part of the process of the peritonæum, near the ring of the abdominal muscles, leaving

leaving the testicle in its natural position : the wire is twisted by a pair of forceps, so as to confine the process of the peritonæum without compressing the spermatic vessels, in order to prevent the intestine from falling through it again : this method, however, is not thought effectual in most cases by Heister.

In order to preserve the testicle, some surgeons do not tie the process of the peritonæum and spermatic vessels with a ligature, but having returned the intestines and omentum, they then scarify the ring of the abdomen, through which the intestine prolapsed, together with the skin, in order to render the cicatrix more firm. If in the enterocoele the intestine cannot be reduced, especially if it adhere to the process of the peritonæum, ring of the abdominal muscles, scrotum, or testicle, no truss or bandage will be of any service : there is, then, but one method of saving the patient, by a severe operation ; in order to which the integuments are to be divided ; and when the sacculus appears, it is to be separated, and a small aperture made in it big enough to introduce a quill, or some other instrument to separate the intestine from all its adhesions, before it is protruded into the abdomen, which should always be done when the intestine adheres ; after which the wound is to be healed, and the patient secured from a relapse, by wearing the bandage-spica. See **BANDAGE** and **TRUSS**.

If the stricture of the intestine is so great as to render all means ineffectual to reduce the rupture, the surgeon must then have recourse to the knife to save the patient.

**ENTERO-EPIPOCELE**, a species of rupture, wherein the omentum, together with the intestines, fall into the scrotum. See the preceding article.

**ENTEROLOGY**, a term used by physicians, for a discourse or treatise on the contents of the head, breast, and abdomen. See the articles **HEAD**, &c.

**ENTEROMPHALUS**, the same with a hernia umbilicalis, or rupture at the navel. See the article **EXOMPHALUS**.

**ENTERPLEADER**, in law, signifies the discussing or trial of a point, incidentally falling out, before the principal cause can be determined.

It is allowed that a defendant cannot be twice charged with the same thing, or to two severally, where no default is in him : thus if one man brings detinue against the defendant upon bailment of goods,

and another a trover against the same person ; in this case there shall be an enterpleader, to ascertain which of the parties has a right to his action.

Judgment may be given on an enterpleader, to recover what is demanded against the defendant ; and where two have enterpleaded, the person recovering shall have damages of the other.

**ENTERMENT**, or **INTERMENT**. See the articles **BURIAL** and **INTERMENT**.

**ENTERSOLE**, in architecture, a kind of little story, sometimes called a mezzanine, contrived occasionally at the top of the first story, for the convenience of a wardrobe, &c.

**ENTERTAINMENT**, in a theatrical sense. See the article **FARCE**.

**ENTHALIUM**, in natural history, a kind of tubulus marinus. See **TUBULUS**.

**ENTHUSIASM**, *ενθουσιασμος*, a transport of the mind, whereby it is led to think and imagine things in a sublime, surprising, yet probable manner. This is the enthusiasm felt in poetry, oratory, music, painting, sculpture, &c.

**ENTHUSIASM**, in a religious sense, implies a transport of the mind, whereby it fancies itself inspired with some revelation, impulse, &c. from heaven. Mr. Locke gives the following description of enthusiasm. " In all ages, men in whom melancholy has mixed with devotion, or whose conceit of themselves has raised them into an opinion of a great familiarity with God, and a nearer admittance to his favour than is afforded to others, have often flattered themselves with a persuasion of an immediate intercourse with the deity, and frequent communications from the divine spirit. Their minds being thus prepared, whatever groundless opinion comes to settle itself strongly upon their fancies, is an illumination from the spirit of God, and presently of divine authority. And whatsoever odd action they find in themselves a strong inclination to do, that impulse is concluded to be a call or direction from heaven, and must be obeyed. It is a commission from above, and they cannot err in executing it. This I take to be properly enthusiasm, which, though arising from the conceit of a warm and overweening brain, works when it once gets footing more powerfully on the persuasions and actions of men, than either reason or revelation, or both together. Men being

" most



"most forwardly obedient to the impulse they receive from themselves."

Devotion, when it does not lie under the check of reason, is apt to degenerate into enthusiasm. When the mind finds itself inflamed with devotion, it is apt to think that it is not of its own kindling, but blown up with something divine within it. If the mind indulges this thought too far, and humours the growing passion, it, at least, flings itself into imaginary raptures and ecstasies; and when once it fancies itself under the influence of a divine impulse, no wonder if it slight human ordinances, and refuses to comply with the established form of religion, as thinking itself directed by a much superior guide.

**ENTHUSIAST**, a person possessed with enthusiasm. See the preceding article.

**ENTHYMEME**, *εὐθυμια*, among logicians, denotes a syllogism, perfect in the mind, but imperfect in the expression, by reason one of the propositions is suppressed, as being easily supplied by the understanding of those with whom we discourse. e. g. *In every right-lined triangle, the three angles are just equal to two right ones; therefore, those of an isosceles are so:* where the proposition, *every isosceles is a right-lined triangle*, is omitted, as being sufficiently known. But to give a more familiar example; suppose the enthymeme to be, *every man is mortal; therefore every king is mortal*: where the minor proposition, *every king is a man*, is omitted for the reason already mentioned. There is a particular elegance in the enthymeme form of arguing, as leaving somewhat to the exercise and invention of the mind; for which reason it is very frequent, as well in common conversation, as in the most polite writers. It not only shortens discourse, and adds a certain force and liveliness to our reasoning, but gives the reader a pleasure not unlike that the author himself feels in composing. By this means we are put upon exerting ourselves, and seem to share in the discovery of what is proposed to us.

**ENTIER**, in the manege, a resty horse that not only refuses to turn, but resists the hand: provided he flies or parts for the two heels, you have a remedy for him, by using a cavesson made after the duke of Newcastle's way.

**ENTIER** also denotes a bit-mouth. See the article **BIT**.

**ENTIERTY**, or **ENTIERTIE**, among lawyers, signifies the whole of a thing,

in contradistinction to a moiety: thus a bond, damages, &c. are said to be intire, when they cannot be apportioned.

**ENTIRE TENANCY**, in law, is when the sole possession is in one person; in contradistinction to several tenancy, which is a joint or common possession in two or more.

**ENTITIVELY** and **ENTITY**, among metaphysicians. See the article **ENS**.

**ENTOMON PYRAMIDALE**, in zoology, a name by which some call the pyramidal oniscus. See the article **ONISCUS**.

**ENTOYER**, in heraldry, denotes a bordure charged wholly with things without life: it seems to be a corruption of the french *entour*, round about.

**ENTRAILS**, the same with intestines. See the article **INTESTINES**.

**ENTRANCE** of bounds, among sportsmen, denotes the instructing them how to hunt: for which purpose, it is proper to lead them through warrens and flocks of sheep, to enure them to be under command, and to run at nothing without the huntsman's orders; and when the game appears, the young hounds are to be entered along with the best and staunchest hounds that can be got, and not one barking dog suffered to be near. The hare is the best game on such an occasion, because, in this chase, the young hounds will learn all the doublings they can possibly meet with in any other kind. When the hare is killed, they must not be allowed to break her up; but the huntsman is to skin and cut her in pieces, with which the young hounds are to be rewarded.

**ENTRE MINHO DOURO**, a province of Portugal, having the river Mino on the north, Douro on the south, and the Atlantic ocean on the west.

**ENTRE TAYO** and **GUADIANA**, a province of Portugal, having that of Estremadura on the north, and the Atlantic ocean on the west.

**ENTREPAS**, in the manege, a broken pace or going that is neither walk nor trot, but has somewhat of an amble.

This is the pace or gait of such horses as have no reins or back, and go upon their shoulders; or, of such as are spoiled in their limbs.

**ENTRING a ship**, the same with boarding. See the article **BOARDING**.

**ENTRING-LADDERS**, in a ship, are of two sorts; one used by the vessel's sides, in a harbour, or in fair weather, for persons to go in and out of the ship: the other is made

made of ropes, with small staves for steps; and is hung out of the gallery to enter into the boat, or to come aboard the ship, when the sea runs so high that they dare not bring the boat to the ship's side for fear of staving it.

**ENTRING-PORTS.** See the article **PORT**.

**ENTRING-ROPE.** See the article **ROPE**.

**ENTROCHUS**, in natural history, a genus of extraneous fossils, usually of about an inch in length, and made up of a number of round joints, which when separate and loose, are called trochitæ: they are composed of the same kind of plated spar with the fossil shells of the echini, which is usually of a bluish-grey colour, and very bright where fresh broken; they are all striated from the center to the circumference, and have a cavity in the middle. See plate XCH. fig. 3.

The entrochi are found of all sizes, from that of a pin's head to a finger's length, and the thickness of one's middle finger; and are plainly of marine origin, having often sea-shells adhering to them. They seem to be the petrified arms of that singular species of the sea-starfish, called *stella arboreicens*.

They are esteemed very powerful diuretics, and prescribed in nephritic cases with good success; the dose being as much of the powder, as will lie on a shilling.

**ENTRUSION, or INTRUSION, in law.**

See the article **INTRUSION**.

**ENTRY, in law,** signifies taking possession of lands or tenements, where a person has a right so to do.

It is also used for a writ of possession, which is of divers kinds, as, 1. A writ of *entry sur disseisin*, which lies for the disseisee against the disseisor. 2. A writ of *entry sur disseisin in le per*, that lies for the heir by descent, who succeeding in right of his ancestor, is said to be in the *per* or *pere*. 3. A writ of *entry sur disseisin in le per & cui*, which lies where the feoffee of the disseisor makes a feoffment to another. 4. A writ of *entry sur disseisin in le post*, which lies where after a disseisin the land is removed from one hand to another beyond the degrees, that a writ of entry can be made in the usual form.

The writ of entry is put out of the degrees by five things. 1. Intrusion, as when the disseisor dies seised, and a stranger enters. 2. Succession, when the successor in office or profession enters. 3. Disseisin upon disseisin, when the disseisor

is disseised by another. 4. Judgment, where a person recovers against the disseisor. 5. Escheat, which is when the disseisor dies without heir, or commits felony, &c. on which account the lord enters. In all which cases, a disseisee, or his heir, shall not have a writ of entry within the degrees of the *per*, but in the *post*.

There are several other writs of entry, which lie for the person in reversion, where a tenant for life, for term of years, or by courtesy, aliens, and afterwards dies: and so in other cases.

**Forcible ENTRY.** See **FORCIBLE**.

**ENTRY, among sportsmen,** denotes the places or thickets through which deer are found lately to have passed.

**Bill of ENTRY, in commerce.** See **BILL**.

In making entries inwards, it is usual for merchants to include all the goods they have on board the same ship in one bill, though sometimes they may happen to be upwards of twenty several kinds; and in case the goods are short entered, additional or post entries are now allowed; though formerly the goods, so entered, were forfeited. As to bills of entry outwards; or including goods to be exported, upon delivering them, and paying the customs, you will receive a small piece of parchment called a *cocket*, which testifies your payment thereof, and all duties for such goods. See the article **EXPORTATION**.

If several sorts of goods are exported at once, of which some are free, and others pay customs, the exporter must have two cockets, and therefore must make two entries; one for the goods that pay, and the other for the goods that do not pay custom.

Entries of goods, on which a drawback is allowed, must likewise contain the name of the ship in which the goods were imported, the importer's name, and time of entry inwards. The entry being thus made, and an oath taken that the customs for those goods were paid as the law directs, you must carry it to the collector and comptroller, or their deputies; who, after examining their books, will grant a warrant, which must be given to the surveyor, searcher, or land-waiter, for them to certify the quantity of goods; after which the certificate must be brought back to the collector and comptroller, or their deputies, and oath made that the said goods are really shipped, and not landed

landed again in any part of Great Britain. See the articles **DRAWBACK** and **DEBENTURE**.

**ENVELOPE**, in fortification, a work of earth, sometimes in form of a simple parapet, and at others, like a small rampart with a parapet: it is raised sometimes on the ditch, and sometimes beyond it.

Envelopes are often made to inclose a weak ground, where that is practicable, with single lines, to save the great charge of horn-works and tenails, or where there is not room for such large works. Some give the name of *filion*, counter-guard, conserve, and *lunette*, to envelopes raised in the moat.

**ENVIRONNEL**, in heraldry, signifies surrounded with other things: thus, they say, a lion environné with so many bezants. See the article **BEZANT**.

**ENULA CAMPANA**, **HELENIUM**, or **ELECAMPANE**, in botany. See the article **ELECAMPANE**.

**ENUMERATION**, an account of several things, in which mention is made of every particular article.

**ENUMERATION**, in rhetoric, a part of peroration, in which the orator, collecting the scattered heads of what has been delivered throughout the whole, makes a brief and artful relation, or recapitulation thereof.

**ENUMERATION of the parts**, in rhetoric, is much the same with distribution. See the article **DISTRIBUTION**.

**ENUNCIATION**, a declaration of a thing either in terms of affirmation or denial.

**ENUNCIATION**, among logicians, the same with proposition. See the article **PROPOSITION**.

**ENVOICE**, the same with invoice. See the article **INVOICE**.

**ENVOY**, a person deputed to negotiate some affair with any foreign prince or state. Those sent from the courts of France, Britain, Spain, &c. to any petty prince or state, such as the princes of Germany, the republics of Venice, Genoa, &c. go in quality of envoys, not ambassadors; and such a character only do those persons bear, who go from any of the principal courts of Europe to another, when the affair they go upon is not very solemn or important. There are envoys ordinary and extraordinary, as well as ambassadors; they are equally the same under the protection of the law of nations, and enjoy all the privileges of ambassadors, only differing from them in this,

that the same ceremonies are not performed to them.

**ENURE**, in law, signifies to take effect, or avail: thus, they say, a release made to a tenant for life, shall enure and be of force to the person in reversion.

**ENURNY**, in heraldry, is applied to a bordure charged with beasts.

**ENVY**, in ethics, is defined to be an uneasiness of the mind, caused by the consideration of a good we desire, obtained by one we think less worthy of it than ourselves. See the article **PASSION**.

**EON**, among anatomists, is sometimes used for the whole ambit of the eye.

**EON**, or **ÆON**, in church-history. See the article **ÆON**.

**EPACT**, in chronology, a number arising from the excess of the common solar year above the lunar; whereby the age of the moon may be found out every year. See the articles **YEAR** and **MOON**.

The excess of the solar year above the lunar is 11 days; or the epact of any year expresses the number of days from the last new moon of the old year, which was the beginning of the present lunar year, to the first of January. The first year of the cycle of the moon, the epact is 0, because the lunar year begins with the solar. On the second, the lunar year has begun 11 days before the solar year, therefore the epact is 11. On the third, it has begun twice 11 before the solar year, therefore the epact is 22. On the fourth, it begins three times 11 days sooner than the solar year, the epact would therefore be 33: but 30 days being a synodical month, must that year be intercalated; or that year must be reckoned to consist of thirteen synodical months, and there remains three, which is the true epact of the year; and so on to the end of the cycle, adding 11 to the epact of the last year, and always rejecting 30, gives the epact of the present year. Thus to adjust the lunar year to the solar, through the whole of 19 years, 12 of them must consist of 12 synodical months each, and 7 of 13, by adding a month of 30 days to every year when the epact would exceed 30, and a month of 29 days to the last year of the cycle, which makes in all 209 days, *i. e.*  $19 \times 11$ ; so that the intercalary or embolimæan years, in this cycle are 4, 7, 10, 12, 15, 18, 19. See the article **CYCLE**.

If the new moons returned exactly at the same

same time after the expiration of nineteen years, as the council of Nice supposed they would do (when they fixed the rule for the observation of easter, and marked the new moons in the calendar for each year of the lunar cycle) then the golden number multiplied by 11, would always give the epact. But in a julian century, the new moons anticipate, or happen earlier than that council imagined they would, by  $\frac{8}{25}$  of a day. In a gregorian common century, which is one day shorter than a julian century, they happen  $\frac{1}{25}$  of a day later, ( $1 \text{ day} - \frac{8}{25} = \frac{17}{25}$ ). Now  $\frac{17}{25} \times 3 = \frac{51}{25}$  for the three common centuries, but  $\frac{8}{25}$  being subtracted, on account of the gregorian bissextile century, there will remain  $\frac{43}{25}$ . Therefore in four gregorian centuries, the new moons will happen later by  $\frac{43}{25}$  of a day, and the epacts must be decreased accordingly.

At present the gregorian epact is 11 days short of the julian epact; but the quotient of the number of the centuries divided by 4, which at this time is 4, multiplied by  $\frac{43}{25}$ , with the addition of the remainder 1 multiplied by  $\frac{17}{25}$ , makes in all but  $\frac{89}{25}$ , or 7 days  $+\frac{14}{25}$ , therefore  $\frac{86}{25}$ , i. e. 3 days  $+\frac{14}{25}$  must be added to complete the 11 days. Whence we have the following

**General rule for finding the gregorian EPACT for ever.** Divide the centuries of any year of the christian æra by 4, (rejecting the subsequent numbers;) multiply the remainder by 17, and to this product add the quotient multiplied by 43; divide the product  $+ 86$  by 25; multiply the golden number by 11, from which subtract the last quotient; and rejecting the thirties, the remainder will be the epact.

Example for 1754.

$$\begin{aligned} 17 \div 4 &= 4 \text{ remains } 1 \\ 1 \times 17 &= 17 \\ 43 \times 4 + 86 + 17 &= 275 \\ 275 \div 25 &= 11 \\ 11 \times 7 \text{ (G. N.º)} &= 77 \\ 77 - 11 &= 66 \\ 66 - 60 (2 \times 30) &= 6 = \text{Epact.} \end{aligned}$$

A shorter rule for finding the epact until the year 1900. Subtract 1 from the golden number; and multiplying the remainder by 11, reject the thirties, and you have the epact.

Example for the year 1754.

$$\begin{aligned} \text{G. N.} &= 7 \\ \text{G. N.} - 1 &= 6 \\ 66 - \text{twice } 30 &= 6 = \text{Epact.} \end{aligned}$$

$$\begin{aligned} \text{G. N.} &= 7 \\ 1 & \\ 6 & \\ 11 & \\ 30 \times 66 &= 2 \\ 6 & = \text{Ep.} \end{aligned}$$

A table of golden numbers, and their corresponding epacts, till the year 1900.

G. N.º	Epact.	G. N.º	Epact.	G. N.º	Epact.	G. N.º	Epact.
1	06	25	11	20	16	15	
2	11	7	6	12	17	26	
3	22	8	17	13	12	18	7
4	39	28	14	23	19	18	
5	14	10	9	15	4		

**EPANORTHOSIS**, in rhetoric, a figure by which a person corrects, or ingeniously revokes what he just before alledged, as being too weakly expressed, in order to add something stronger, and more conformable to the passion with which he is agitated.

The epanorthosis is distinguished into two kinds, the one is when we correct or revoke the word, as in the following example of the apostle, *but I laboured more abundantly than they all: yet not I, but the grace of God, which was with me.* 1 Cor. xv. 10. where what he first attributed to his own merit, he chooses afterwards to call the work of grace, as being the principal cause. The second kind of epanorthosis, is when we correct or revoke the sentiment, as in the following of Cicero: *Italiam ornare, quam domum suam, maluit: quamquam, Italia ornata, domus ipsa mihi videtur ornatio.*

**EPARER**, in the manege, signifies the flinging of a horse, or his yerking and striking with his hind legs. See **YERK**. In caprioles, a horse must yerk out behind with all his force; but in ballotades, he strikes but half out; and, in croupades, he does not strike out his hind legs at all. All such yerking horses are reckoned rude. See the articles **CAPRIOLE**, **BALLOTADE**, &c.

**EPAULE**, in fortification, denotes the shoulder of a bastion, or the place where its face and flank meet, and form the angle called the angle of the shoulder. See the article **BASTION**.

**EPAULEMENT**, in fortification, a work raised to cover sidewise, is either of earth, gabions,

gabions, or fascines, loaded with earth. The epaulements of the places of arms for the cavalry, at the entrance of the trenches, are generally of fascines mixed with earth.

**EPAULEMENT** also denotes a mass of earth, called likewise a square orillon from its figure, raised to cover the cannon of a cazemate, and faced with a wall.

It is likewise used for any work, thrown up to defend the flank of a post, or other place.

**EPEMBOLE**, in rhetoric, the same with parembolē. See the article **PAREMBOLE**.

**EPENTHESIS**, in grammar, the interposition or insertion of a letter or syllable in the middle of a word, as *akituum*, for *alitur*; *relligio*, for *religio*; *induperator*, for *imperator*, &c.

**EPERLANUS**, in ichthyology, the name used by authors for the olmerus, with seventeen rays in the fin beside the anus, and called in english the finelt. See the article **OSMERUS**.

**EPERON**, the SPUR-SHELL, in natural-history. See the article **SPUR-SHELL**.

**EPHA**, or **EPHAH**, in jewish antiquity, a measure for things dry, containing 1.0961 of a bushel. See **MEASURE**.

**EPHÆTUM**, in botany, a name used by some for the ranunculus, or crowsfoot. See the article **RANUNCULUS**.

**EPHEDRA**, the SEA-GRAPE, or SHRUB HORSE-TAIL, in botany, a genus of the *dioecia-syngenesia* class of plants, which has no corolla or flower-petals: the stamina are seven filaments, coalescing into a subulated column; the antheræ are roundish, three being superior, and the other four inferior: the seeds are acutely oval, convex on one side, and plain on the other, and contained in a baccated cup. The fruit is red, succulent, and of an acid austere taste: its juice, taken in wine, is said to be good for the coeliac passion and fluor albus.

**EPHEDRA** is also used by some for the equisetum, or horse-tail. See **EQUISETUM**.

**EPHEMERA**, in medicine, the name of a species of fever continuing the space of one day, or sometimes more; for the medical writers express themselves by *ephemera simplex*, *vel plurium dierum*.

This species of fever has this peculiar to it, that the pulse is at first large, but as it becomes afterwards moderately quick and frequent, so it is equal, soft, and regular, as in a natural state. The urine undergoes little or no change, nor is the disorder preceded by a loathing of food, a spontaneous lassitude of the body, dis-

turbed sleep, preternatural yawning, or horror; but it seizes the patient suddenly, and afflicts him with no other symptoms than a pain of the head and stomach, a nausea, heat and restlessness. The persons most subject to this fever, are young men who have much blood, and feed heartily, and such as have had any habitual discharge of blood stopped upon them, whether natural, as in the hæmorrhoidal or menstrual discharges, or artificial, such as frequent bleeding, cupping, and the like. And those who have thrown their blood into violent emotions by the too free use of spirituous liquors, too violent exercise, unusual watchings, long stay by large fires, a sudden repression of sweats by cold water, or by violent passions, particularly anger. In the treatment of this fever, the proper course is to temperate the violent motions of the blood with nitrous and the fixed antimonial medicines, and occasionally with gentle acids. Sweat is to be promoted. Nitre, crabs-eyes, &c. may be prescribed in small doses every three or four hours; and towards night, sudorifics should be joined to these, such as the contrayerva-root, or the like. The ephemera, properly so called, differs in nothing except the time of its duration, from that which commonly lasts four days.

**EPHEMERA MALIGNA**, is also a term by which some authors have called the sudor anglicanus, or malignant diary fever, which generally destroyed the patient in twenty-four hours. See the article **SUDOR ANGLICANUS**.

**EPHEMERA**, the DAY-FLY, in zoology, a genus of flies, belonging to the neuroptera order, and so called from their living only one day and a night: they are about the size of the lesser house-flies, and have two gibbous protuberances on the top of the head, resembling eyes: add to this, that the tail is furnished with hairs, and the antennæ are short.

Of this genus there are several species, distinguished by their different colours, and the number of hairs in their tail; some having two, and others three.

**EPHEMERIDES**, in literary history, an appellation given to those books or journals, which shew the motions and places of the planets for every day of the year. It is from the tables contained in these ephemerides, that eclipses, and all the variety of aspects of the planets, are found. See the articles **ECLIPSE**, **CONJUNCTION**, **OPPOSITION**, &c.

**EPHEMERUM**, in botany, the same with the *tradescantia* of Linnaeus. See the article **TRADESCANTIA**.

**EPHIALTES**, *επιαλτης*, in medicine, the same with the incubus, or night-mare. See the article **INCUBUS**.

**EPHIPPUIM**, in anatomy, the same with the *cella turcica*, being a part of the *os sphencoides*. See the article **SPHENOIDES**.

**EPHOD**, in jewisi antiquity, one part of the priestly habit; being a kind of girdle which, brought from behind the neck over the two shoulders, and hanging down before, was put cro's the stomach, then carried round the waist, and made use of as a girdle to the tunic.

There were two sorts of ephods, one of plain linnen for the priests, and the other embroidered for the high priest. Of this last Moses gives an ample description. It was composed of gold, blue, purple, crimson and twisted cotton. Upon part of it, which passed over the shoulders, were two large precious stones, one on each shoulder: upon these were engraven the name of the twelve tribes, six upon each stone.

The ephod was peculiar to the priesthood, and thought essential to their character; it being the opinion of the Jews, that no worship, true or false, could subsist without a priesthood and ephod.

**EPHORI**, *εφοροι*, in grecian antiquity, magistrates established in ancient Sparta to ballance the regal power. The authority of the ephori was very great. They sometimes expelled and even put to death the kings, and abolished or suspended the power of the other magistrates, calling them to account at pleasure. There were five of them, others say nine. They presided in the public shews and festivals. They were entrusted with the public treasure, made war and peace, and were so absolute, that Aristotle makes their government equal to the prerogative of a monarchy. They were established by Lycurgus.

**EPHYDRUM**, in botany, the same with the *equisetum*, or horse-tail. See the article **EQUISETUM**.

**EPIBATERION**, *επιβατηριον*, in antient poetry, a poem rehearsed at a person's return from a voyage, thanking the immortal gods for his preservation.

**EPIC**, or **HEROIC POEM**, a poem expressed in narration, formed upon a story partly real, and partly feigned; representing, in a sublime stile, some signal and fortunate action, distinguished by a va-

riety of great events, to form the morals, and affect the mind with the love of heroic virtue. See the article **POEM**.

We may distinguish three parts of the definition, namely, the matter, the form, and the end. The matter includes the action of the fable, under which are ranged the incidents, episodes, characters, morals, and machinery. The form comprehends the way or manner of the narration, whether by the poet himself, or by any persons introduced, whose discourses are related: to this branch likewise belong the moving of the passions, the descriptions, discourses, sentiments, thoughts, stile, and versification; and besides these, the similes, tropes, figures, and, in short, all the ornaments and decorations of the poem. The end is to improve our morals, and increase our virtue. See the articles **ACTION**, **FABLE**, **EPISODE**, **CHARACTER**, &c.

There are two things which chiefly distinguish epic from tragedy, the manner of the representation, and the event or catastrophe. As to the former it is certain that tragedy is formed upon action, and epic upon narration. This is the principal character in an heroic poem, and a very difficult part of it. The qualities a narration must have to be perfect, are these: it must be short and succinct, that nothing may be idle, flat, or tedious: it must be lively, quick, and delightful: it must be simple and natural. The most ordinary graces of a narration, must come from the figures, the transitions, and from all those delicate turns that carry the reader from one thing to another, without his regarding it. It must never point out all the matter, that some may be left for the natural reflections of the reader. It must likewise avoid the particulars and length of affected descriptions. Lastly, the narration must be delightful, not only by the variety of things it relates, but by the variety of its numbers. It is this variety that makes the greek versification more harmonious and more proper for narration than the Latin.

Epic also differs from tragedy in the event, or conclusion. In tragedy, the conclusion is generally unfortunate, but never so in epic: the reasons of which rule are the examples of Homer and Virgil, who are, and ought to be, our guides and patterns in this particular, and in which they have been universally followed by all who would have been thought

epic

epic writers ; and not only their authority, but the very reason of the thing supplies us with arguments for this rule.

1. Although in tragedy, where the action is much shorter, more simple, and finished, as it were, at a heat, an unfortunate conclusion may be so far from displeasing, that it may be more agreeable to the audience : yet in epic, after such a series and variety of adventures, after sustaining so many and such great difficulties, the reader must be out of humour with the poet, unless the whole should conclude happy at last. 2. The chief end of tragedy is to excite the passions, especially those of terror and pity, by a short and brisk emotion ; but the design of an epic poem is, by more slow and leisure operations, to remove bad habits, and restore good ones ; to subdue vice and recommend virtue, which would be done with a very ill grace, if the hero of the poem should come to a deplorable end. 3. An epic poem, properly so called, is, and should be, written in honour of the country and religion of the author, between which and the hero there is a near relation ; and therefore he ought to come off in triumph at last. These two differences are, as the schools call them, specific differences, being so in nature : the others are only accidental, being differences in degree, extent, and greatness. Although epic poetry is directed to the morals and the habit rather than the passions, yet it likewise has passions, but in an inferior degree to tragedy : for though it has a mixture of all the passions, yet joy and admiration are the most essential to it.

An epic poem must be formed upon a story partly real and partly fictitious. In tragedy, which is much shorter, the performance may not only be excusable, but commendable, though the whole fable should be fictitious ; but in such a long work as that of an epic poem, the reader will be tired unless he has the pleasure of finding some truth interwoven with the fable.

The moderns seem to mistake that part of the epic and tragedy which contain the wonderful, confounding it with improbable, and using the two words promiscuously. If it was really so, the wonderful would be always faulty ; for that is always so which is improbable. The great art is a just temperament and mixture of both, to make it natural and pro-

bable. Scarce any of the poets but Virgil had the art, by the preparation of incidents, to manage the probability in all the circumstances of an epic poem. Homer is not altogether so scrupulous and regular in his contrivances : his machines are less just, and all his measures, to save the probability, are less exact. Lastly, the sovereign perfection of an epic poem, in the opinion of Aristotle, consists in the just proportion and perfect connection of all the parts. It is not sufficient that all be grand and magnificent in an epic poem, but all must be just, uniform, and proportionable, in the different parts that compose it.

This is all that can be observed most essential to an epic poem : little need be said about the machinery, which, among the antient heathens, was the agency of their false gods, and of angels and dæmons among us christians : its beauty and magnificence is well known. The dignity of an epic poem would scarce be kept up without it, especially since the marvellous depends on it. The versification of epic poetry, among the Greeks and Romans, consisted of hexameters, a sort of verse so peculiar to epic, that when it is used upon other occasions, it is called heroic verse. Our english verse comes nearest to it both in gravity and majesty, but at how great a distance ? See the article *HEXAMETER*. An epic or heroic poem, is the best and most perfect kind of poetry ; it is the greatest work which the soul of man is capable of performing ; and here it is the utmost bounds are set to human composition. All the nobleness and the elevation of the most perfect genius, can hardly suffice to form such a one as is requisite for an heroic poet : the difficulty of finding together fancy and judgment, heat and imagination, and sobriety of reason, precipitation of spirit, and solidity of mind, renders this character so very rare : it requires great images, and yet a greater wit to form them. There must be a judgment so solid, a discernment so exquisite, such perfect knowledge of the language in which he writes, such obstinate study, profound meditations, and vast capacity, that scarce whole ages can produce one genius fit for an epic poet : even among the antients themselves, if we except Homer and Virgil, we shall scarce find one that is truly an epic poet.

**EPICALYMMA**, in the history of shell-fish, the same with operculum. See the article **OPERCULUM**.

**EPICARPIUM**, in antient pharmacy, denotes a remedy applied in form of a plaster to the wrists: it consisted of penetrating ingredients, as garlic, onion, camphor, &c.

**EPICEDIUM**, *ἐπιχέδιον*, in antient poetry, a poem rehearsed during the funeral solemnity of persons of distinction. See the article **NENIA**.

We find two beautiful epicediums in Virgil, one of Euryalus, and the other of Pallas.

**EPICERAS**, a name used by some for foenugreek. See the article **FOENUGREEK**.

**EPICRASTICS**, in pharmacy, denote much the same with emollients. See the article **EMOLLIENTS**.

Epicraastic medicines obtund the acrimony of the humours, and mitigate the uneasy sensation thence arising.

To this class belong, 1. The emollient roots, as marshmallow, liquorice, &c.

2. The leaves of mallows, water-lilly, the large house-leek, purslain and lettuce.

3. The seeds of barley decorticated, henbane, lettuce, flax, white poppy, and rue.

4. Fruits, as jubebs, raisins, sweet apples, prunes, and sweet almonds. 5. Cooling juices, whites of eggs, whey, oils, syrup, and sugar of violets, &c.

**EPICHIREMA**, *ἐπιχίρημα*, in logic, a mode of reasoning, which comprehends the proof of one or both the premises of a syllogism, before the conclusion is drawn.

**EPICHORDIS**, in anatomy, a name by which some call the mesentery.

**EPICOENE**, in grammar, a term applied to nouns, which, under the same gender and termination, mark indifferently the male and female species. See **GENDER**. These nouns are otherwise called *promiscua*, and comprehend the names of a great number of the wild beasts, more of the wild fowls, and almost all the fishes, whereof the difference of sexes is either difficult to be discerned, or is rarely adverted to; such are, in Latin, *elephantus*, *passer*, *aquila*, *salmo*, which equally signify a male or female elephant, sparrow, eagle, or salmon. As often as either of the sexes are to be distinctly mentioned, it is generally done by prefixing to the word male (*mas*) or female (*femina*.)

**EPICUREAN PHILOSOPHY**, the doctrine or system of philosophy maintained by Epicurus and his followers.

Epicurus, the Athenian, one of the greatest philosophers of his age, was obliged to Democritus for almost his whole system, notwithstanding he piqued himself upon deriving every thing from his own fund. He wrote a great number of books, which are made to amount to above 300. Though none of them are come down to us, no antient philosopher's system is better known than his, for which we are mostly indebted to the great Lucretius, Diogenes Laertius, and Tully.

His philosophy consisted of three parts, canonical, physical, and etherial. The first was about the canons, or rules of judging. The censure which Tully passes upon him for his despising logic, will hold true only with regard to the logic of the stoics, which he could not approve of, as being too full of nicety and quirk. Epicurus was not acquainted with the analytical method of division and argumentation, nor was he so curious in modes and formation as the stoics. Soundness and simplicity of sense, assisted with some natural reflections was all his art. His search after truth proceeded only by the senses, to the evidence of which he gave so great a certainty, that he considered them as an infallible rule of truth, and termed them the first natural light of mankind.

In the second part of his philosophy he laid down atoms, space, and gravity as the first principles of all things: he did not deny the existence of a God, but thought it beneath his majesty to concern himself with human affairs: he held him a blessed, immortal being, having no affairs of his own to take care of, and above meddling with those of others. See **ATOMICAL PHILOSOPHY**.

As to his ethics, he made the supreme good of man to consist in pleasure, and consequently supreme evil in pain. Nature, itself, says he, teaches us this truth, and prompts us from our birth to procure whatever gives us pleasure, and avoid what gives us pain. To this end he proposes a remedy against the sharpness of pain: this was to divert the mind from it, by turning our whole attention upon the pleasures we have formerly enjoyed: he held that the wise man must be happy, as long as he is wise; that pain,



pain, not depriving him of his wisdom, cannot deprive him of his happiness.

There is nothing that has a fairer shew of honesty than the moral doctrine of Epicurus. Gassendus pretends, that the pleasure in which this philosopher has fixed the sovereign good, was nothing else but the highest tranquillity of mind in conjunction with the most perfect health of body : but Tully, Horace, and Plutarch, as well as almost all the fathers of the church, give us a very different representation : indeed the nature of this pleasure, in which the chief happiness is supposed to be seated, is a grand problem in the morals of Epicurus. Hence there were two kinds of Epicureans, the rigid and the remiss : the first were those who understood Epicurus's notion of pleasure in the best sense, and placed all their happiness in the pure pleasures of the mind, resulting from the practice of virtue. The loose or remiss Epicureans, taking the words of that philosopher in a gross sense, placed all their happiness in bodily pleasures, or debauchery. Thus we have the whole mystery of this celebrated doctrine. It was innocent in expression, but criminal in thought ; it had a beautiful outside, but it was all corruption within. These loose philosophers took up a seeming austerity to disguise their secret indulgence, and all their schemes of morality were but so many veils for their immoral behaviour.

**EPICYCLE**, *ἐπικύκλιος*, in the antient astronomy, a little circle whose center is in the circumference of a greater circle ; or it is a small orb, or sphere, which being fixed in the deferent of a planet, is carried along with it ; and yet, by its own peculiar motion, carries the planet fastened to it round its proper center.

It was by means of epicycles, that Ptolemy and his followers solved the various phenomena of the planets, but more especially their stations and retrogradations. See the articles **PTOLEMAIC SYSTEM**, **STATION**, and **RETROGRADATION**.

The great circle they called the excentric or deferent, and along its circumference the center of the epicycle was conceived to move ; carrying with it the planet fixed in its circumference, which in its motion downwards proceeded according to the order of the signs, but, in moving upwards, contrary to that order.

The highest point of a planet's epicycle they called apogee, and the lowest perigee. See **APOGEE** and **PERIGEE**.

**EPICYCLOID**, in geometry, a curve generated by the revolution of the periphery of a circle, *ACE* (plate *LXXXVIII.* fig. 3.) along the convex or concave side of the periphery of another circle, *DGB*.

The length of any part of the curve, that any given point in the revolving circle has described, from the time it touched the circle it revolved upon, shall be to double the versed sine of half the arch, which all that time touched the circle at rest, as the sum of the diameters of the circles, to the semidiameter of the resting circle, if the revolving circle moves upon the convex side of the resting circle ; but if upon the concave side, as the difference of the diameters to the semidiameter of the resting circle.

In the philosophical transactions, n<sup>o</sup> 218, we have a general proposition for measuring the areas of all cycloids and epicycloids, *viz.* The area of any cycloid or epicycloid is to the area of the generating circle, as the sum of double the velocity of the center and velocity of the circular motion to the velocity of the circular motion : and, in the same proportion, are the areas of segments of those curves to those of analogous segments of the generating circle.

**EPICYEMA**, among physicians, denotes a superfoetation ; being a false conception or mole happening after the birth of a regular foetus. See **MOLE**.

**EPIDEMIA**, *ἐπιδημία*, in grecian antiquity, festivals kept in honour of Apollo and Diana, at the stated seasons when these deities, who could not be present every where, were supposed to visit different places, in order to receive the vows of their adorers.

The festival took its name *epidemia*, from *ἐπι*, among, and *δημος*, people ; on account of the imaginary presence of those deities among the people.

**EPIDEMIA** is also used for private feasts, or rejoicings, on account of the safe return of a friend from a voyage or journey.

**EPIDEMIC**, among physicians, an epithet of diseases which at certain times are popular ; attacking great numbers at or near the same time. See **DISEASE**.

Epidemic diseases differ from those called endemic. See the article **ENDEMIC**.

Boerhaave

Boerhaave observes, that though every particular disease, in various epidemical constitutions, appear, to unattentive observers, the same with regard to their names, signs, and consequences in some measure; yet to the judicious, they will appear quite otherwise, so as to require a different administration of the non-naturals, different treatment, and different medicines. This variety, however, in epidemical diseases, is so obscure, that physicians have not yet been able to deduce it from any abuse of non-naturals: and yet there are many circumstances which make it highly probable, that the causes reside in the air, but depend more upon the inexplicable variety of exhalations contained therein, which, by their mixture with the fluids of the body, or their stimulus, injure the human machine, than upon any change in the sensible qualities thereof. See EFFLUVIA.

Upon the invasion of any unknown epidemical distemper, the physician will receive some information with respect to the cure. 1. By reducing the distemper to some more known kind, which it most resembles. 2. By observing its tendency at the vernal and autumnal equinoxes; at which seasons it is generally most prevalent. 3. By attending to the spontaneous phenomena, which precede, accompany, or follow the death or recovery of the patient, and the better or worse state of the disorder. 4. By diligently remarking the benefit or injury received, from whatever the patients are unavoidably obliged to do; and from whatsoever is taken into, or discharged out of the body. 5. By comparing the cases of a great many patients, labouring under the distemper at the same time. 6. By abstaining from all remedies which are dubious, which irritate and induce a considerable change in the humours, and thereby obscure the nature and tendency of the disease.

According to Van Swieten, the origin of epidemic fevers, and we may add of other epidemical disorders, is always from some cause in common to the whole people who inhabit any particular place: thus, for example, when in besieged cities the scantiness of the market obliges all to use an ill course of diet; hence it is, that they have usually the same course and symptoms, in different patients, and therefore require the same method of

cure. See the articles FEVER, SMALL-POX, &c.

**EPIDENDRA**, in botany, a term used by some naturalists for the parasitical plants, or those which grow on trees, shrubs, and other vegetables: such are mistletoe, dodder, &c. See the articles MISLETOE, DODDER, &c.

**EPIDENDRUM, BASTARD-VANILLA**, in botany, a genus of the *gynandria diandria* class of plants, the flower of which consists of five very long and patent petals: the stamina are two very short filaments, growing upon the pistil: the fruit is a very long, rounded, and carnosé pod, containing a multitude of minute seeds.

**EPIDERMIS**, in anatomy, the same with the cuticle. See the article CUTICLE.

**EPIDIDYMIS**, in anatomy, the name by which some call the two bodies more usually known by that of parastatæ. See the article PARASTATÆ.

**EPIGASTRIC REGION**, a part or subdivision of the abdomen. See the article ABDOMEN.

**EPIGASTRIC VESSELS**, the arteries and veins belonging to the epigastric region; the former being branches of the coeliac artery, and the latter of the iliac veins. See the articles ARTERY and VEIN.

**EPIGLOTTIS**, in anatomy, one of the cartilages of the larynx, or wind-pipe. It is often of the shape of an ivy-leaf, and joined to the thyroide cartilage; over which it appears erect, immediately behind the root of the tongue; to which it is also connected by its middle ligament, by two lateral ones to the cornua of the os hyoides, and by two posterior ones, to the arytenoide cartilage. In the act of swallowing, it covers the glottis, or aperture of the larynx, and prevents any thing getting into it. See the articles LARYNX and GLOTTIS.

**EPIGRAM**, in poetry, a short poem in verse, treating only of one thing, and ending with some lively, ingenious, and natural thought or point.

Epigram originally signified the same as inscription, it being usual among the antients to cut inscriptions upon columns, walls, statues, trophies, shields, &c. which inscriptions, when expressed in poetical conceits, were afterwards termed epigrams. In process of time, other poems of the like nature went by the name of epigrams, from their affinity with those inscriptions, and people began

to use them for the relating of little facts and accidents, the characterizing of persons, &c.

The chief characteristics of the epigram are acuteness and facetiousness. It should only tend to one point, which is always to be expressed with strength and poignancy in the last verse, excepting some that are more remarkable for their softness and delicacy, or some other elegance. But above all things, a redundancy, or superfluity of expression, is to be avoided. Authors are much divided as to the length of an epigram. There are instances both among the antients and moderns of very long ones, but still it is allowed, that the shorter are the better, as seeming most natural to this kind of poem. The greek epigrams run upon a turn of thought which is natural, but fine and subtle. They have nothing that bite, yet they are not insipid except a few, which are quite flat and spiritless. We speak of these collected in the anthology. The latin epigram, by a false taste that prevailed in the beginning of the decay of pure latinity, endeavours to surprize the reader by a point. Catullus writ after the greek manner, for he endeavours to close a natural thought with a delicate turn of words, and with the simplicity of a very soft expression. Martial was in some measure the author of the other way. Boileau says, the finess and subtilty of the epigram should turn upon the words, rather than the thoughts, by which means he reduces it to the nature of a pun, or equivocal. See the article PUN.

**EPIGRAPHE**, *επιγραφή*, among antiquarians, denotes the inscription of a building, pointing out the time when, the persons by whom, the uses, and the like, for which it was erected.

**EPILEPSY**, *επιληψία*, in medicine, the same with what is otherwise called the falling-sickness, from the patient's falling suddenly to the ground. Sometimes this disease comes upon the patient unawares; but it more frequently gives notice of its approach, by a lassitude of the whole body, a heavy pain in the head, with some disturbance of the senses, unquiet sleep, unusual dread, dimness of sight, and a noise in the ears: in some there is a violent palpitation of the heart, a puffing or inflation of the breast, difficult respiration, a murmuring noise in the belly, foetid stools, a flux of the urine, and a refrigeration of

the joints: in others, there is a sensation as it were of cold air, ascending from the extreme parts towards the brain and heart. At length falling senseless to the ground, the thumbs are shut up close in the palms of the hands, and are with difficulty taken out: the eyes are distorted or inverted, so as nothing but the whites appear: all sensation is suspended, insomuch that no smell, no noise, nor even pinching of the body is able to bring them to themselves: they frothe at the mouth, with a hissing kind of noise; the tongue is lacerated, or torn by the teeth, and there is a shaking or trembling of the joints. However, in different patients, the symptoms vary; for sometimes instead of convulsive motions, the limbs are all stiff, and the patient is as immovable as a statue: in infants, the penis is erected; and, in young men, there is an emission of the semen, and the urine sometimes streams out to a great distance. At last there is a remission of the symptoms, and the patients come to themselves after a longer or shorter interval; then they complain of a pain and heaviness of the head, and a lassitude of all their joints.

These fits usually return on certain days, or age of the moon, but especially about the new or full moon; in women, chiefly about the time of menstruation; and as to the prognostics, they generally leave the patient about the time of puberty.

As to the cure, in adults, or grown persons, it is extremely difficult; but, in children, it is just the reverse. Blisters laid on the back part of the head are of great use a little before the fit is expected; which may the more certainly be foreknown, as this disease is influenced by the moon. The most proper medicines to correct the juices seem to be native cinabar, and wild valerian-root; a dram of which may be taken morning and evening for three or four months, and afterwards two or three days before the new and full moon. Or, two scruples of the powder of wild valerian-root, mixed with one of that of native cinabar may be taken morning and evening. Ambergrease and musk are also accounted excellent.

It must not however be forgot, that this disease owes its origin to so many different causes, and is bred in so many different constitutions of the body, that the same remedy which succeeds in one case, often fails in another; and, there-

fore, different medicines are to be tried, especially in adults. In case of a plethora, bleeding in the ankles will be proper. If the humours be in fault, cathartics, issues, cauteries, and blisters must be used. If in children, it proceeds from gripes, or the breeding of teeth, nothing is better than to cleanse the belly by milk clysters, with a little venice-soap dissolved in them. Some epileptic powder with cinnabar, or extract of rhubarb, and made into an electuary with syrup of roses and manna, may likewise be given in proper doses.

During the fit, too free an use of volatiles, spirituous liquors, and strong smells are hurtful, as causing the humours to flow too much to the head. The best method is to place the patient in an erect posture, and to rub the hands and feet pretty briskly; and the best drink is pure water, which will mitigate, if not cure, the symptoms.

When the disease is caused by external violence, or extravasations of humours in the head, cinnabar reduced into an impalpable powder, and given in large doses with other cephalics and diaphoretics, has a kind of specific virtue.

According to Dr. Cheyne, a milk-diet will cure the most inveterate epilepsy. Milletoe is also said to cure it, as sure as the bark does an intermitting fever: its dose, to grown people, is half a dram or more, in powder, to be taken every sixth hour, drinking after it a draught of a strong infusion of the same plant; and if to every ounce of the powder, a dram of *assa foetida* be added, the medicine will be still more effectual. Cinnabar of antimony is also greatly celebrated for the cure of this disease, and may be taken from four grains to a scruple, in conserve of rosemary-flowers. If the disease is inveterate, some advise to give the following pills for a month, *viz.* Take castor and gum ammoniac, of each eight grains; wild valerian-root, half a scruple; salt of tartar, seven grains; and as much of tincture of castor as is sufficient to form them into pills, one of which makes a dose. On every seventh day, a cathartic should be given; and sometimes, instead of the castor and gum, filings of steel may be substituted.

A decoction of guaiacum, or saffrafras, taken twice a day, six or eight ounces at a time, and continued for thirty or forty days, is also said to cure the epilepsy;

especially, if male piony-root, or the like, be added.

The following electuary is also recommended as a most excellent and certain anti-epileptic: Take of peruvian bark, pulverised, six drams; of virginia snake-root, likewise pulverised, two drams; and of the syrup of piony-flowers, as much as is sufficient to make a soft electuary. The dose, after proper evacuations, in adults, is a dram; which should be taken morning and evening for three or four months; and afterwards only repeated three or four days before the new and full moon.

**EPILINUM**, in botany, the same with *cuscuta* or dodder.

**EPILOBIUM**, in botany, the *WILLOW-HERB*, a genus of the *ostandria-monogynia* class of plants, the corolla whereof consists of four roundish patent petals, somewhat emarginated: the fruit is a very long capsule of a cylindraceous form, striated, made up of four valves, and containing four cells: the seeds are numerous, oblong, and crowned with down.

**EPILOGUE**, in oratory, the end or conclusion of a discourse, ordinarily containing a recapitulation of the principal matters delivered. See **PERORATION**.

**EPILOGUE**, in dramatic poetry, a speech addressed to the audience after the play is over, by one of the principal actors therein, usually containing some reflections on certain incidents in the play, especially those in the part of the person that speaks it.

The epilogue is but of modern date, much later than the prologue: several have taken the exodium of the Greek drama for an epilogue; but it appears that they are very different; as the exodium was the last of the four parts of the tragedy, containing the unravelling the plot, answering to the last act of modern tragedy.

In the modern tragedy the epilogue has usually somewhat of pleasantry, intended, in all probability, to compose the passions raised in the course of the representation. This is ridiculed by the Spectator, and compared to a merry jig upon the organ, after a good sermon, to wipe away any impressions that might have been made thereby, and send the people away just as they came. This practice, however, has the countenance of antiquity, for the Romans had something of the same nature, though under a different

different name; but their exodium was a kind of farce or pantomime, brought on the stage when the tragedy was over; to compose the minds of the audience.

**EPIMEDIUM**; **BARREN-WORT**, in botany, a genus of the *tetrandia-monogynia* class of plants, the flower of which consists of four ovated, obtuse, concave, patent petals: the fruit is an oblong acuminated pod, composed of one cell, but divided by two valves, containing several oblong seeds.

If we may believe Dioscorides, the leaves of this plant, triturated and drank to the quantity of five drams in wine, for five days together, after the menstrual purgation, effectually prevent conception.

**EPIMELIS**, a term used by some authors for the medlar. See **MEDLAR**.

**EPIMYTHION**, in rhetoric, the same with **FABLE**. See the article **FABLE**.

**EPINICION**, in the greek and latin poetry, denotes a poem or composition on occasion of a victory obtained. It also signifies a rejoicing, or festival, on account of a victory.

**EPIPACTIS**, in botany, the same with the helleborine. See **HELLEBORINE**.

**EPIPETRON**, a name sometimes given to the epimedium. See the article **EPIMEDIUM**.

**EPIPHANY**, a christian festival, otherwise called the Manifestation of Christ to the Gentiles, observed on the sixth of January, in honour of the appearance of our Saviour to the three magi, or wise men, who came to adore him, and bring him presents. The feast of epiphany was not originally a distinct festival, but made a part of that of the nativity of Christ, which being celebrated twelve days, the first and last of which were high or chief days of solemnity, either of these might properly be called epiphany, as that word signifies the appearance of Christ in the world.

The kings of England and Spain offer gold, frankincense, and myrrh, on epiphany, or twelfth day, in memory of the offerings of the wise men to the infant Jesus.

The festival of epiphany is called by the Greeks the feast of lights, because our Saviour is said to have been baptized on this day; and baptism is by them called illumination.

**EPIPHONEMA**, in rhetoric, a sententious exclamation containing a lively remark placed at the end of a discourse or narration; such is that of Virgil,

*Fas omne absumpit, Polydorum obruncat, & auro*

*Vi potitur. Quid non mortalia pectora cogis*

*Auri sacra fames?*

And that of Lucrētius, lib. i.

*Tantum religio potuit suadere malorum*

This figure elicits a narration in a very advantageous manner, deeply impresses the thing related upon the memory of the reader, and leaves him well pleased with the sense and sagacity of his author.

**EPIPHORA**, in medicine, a preternatural defluxion of the eyes, when they continually discharge a sharp serous humour, which excoriates the cheeks. The cure is performed by a derivation of the offending humour elsewhere, by bleeding, cupping, blisters, purges, &c. The acrimony is likewise to be corrected by bitter chalybeate wine: sometimes wine drank alone will perform the cure; after which, astrigent topics are to be made use of. See the article **RHEUM**.

If an epiphora has been of long standing, it is difficult to be cured, and often degenerates into a fistula lachrymalis. See the article **FISTULA LACHRYMALIS**.

Pitcairn calls an epiphora a sort of catarrh in the glands of the eye. See the article **CATARRH**.

**EPIPHYLLOSPERMOUS PLANTS**, the same with the capillary ones. See the article **CAPILLARY**.

**EPIPHYSIS**, in anatomy, a bony substance, or as it were a lesser bone, affixed to a larger or principal bone, by the intervention of a cartilage. In young subjects these epiphyses are not continuous to the principal bone, but are only connected by the intermediate cartilage, and hence they are called appendages to the bones. It is to be observed of epiphyses, 1. That they are all cartilaginous in infants; and though they afterwards grow hard, yet they never arrive at the true density of a bone. 2. That most of them degenerate into apophyses in adults. 3. That they do not grow along the plain surface of the bone, but unequally, or by a mutual ingress with the body of it.

The use of the epiphyses is very different in adults and in infants: in adults they seem to serve the bones which contain large quantities of marrow, by way of operculum, that this soft matter may not run out. 2. They are of service to the articulations, rendering the motions more

easy, as well as more determinate. 3. They make the whole bone lighter than it would be, if their place were supplied by absolute bony matter. 4. They increase the power of the muscles about the tendons, by means of their prominences. 5. They add to the size of the places destined for receiving the insertions of the muscles. 6. They give a firmer cohesion to the ligaments which serve in the articulations, and allow an entrance to the blood-vessels. The uses of the epiphyses in infants are, 1. That by means of their yielding softness, they may give way to the compression in the uterus, and suffer the whole bulk to be more folded together than otherwise it could, so that it may lie in a smaller compass. 2. That they may give way to the elongation and growth of the bones. 3. That they may prevent the frequent fractures, which would otherwise unquestionably happen to children from their falls, and the other accidents they are liable to.

**EPIPLASMA**, the same with cataplasim. See the article CATAPLASM.

**EPIPOCELE**, in medicine, is a kind of hernia, or rupture, in which the omentum subsides into the scrotum. The cure consists principally in a reduction of the tumour, by returning the omentum again into the abdomen, and in securing the parts from a relapse by a truss or bandage. See **HERNIA** and **ENTEROCELE**.

**EPIPOLOIS**, in anatomy, a term applied to the arteries and veins distributed thro' the substance of the epiploon or caul: thus, the dextra epiplois is a branch of the right side of the celiac artery, and the sinistra epiplois and gastro-epiplois are terms by which anatomists call branches from the left side of the celiac artery. See the articles **CÆLIAC** and **ARTERY**.

**EPIPLOOMPHALON**, *ἐπιπλοομφαλον*, in medicine, an hernia umbilicalis, proceeding from the omentum falling into the region of the umbilicus or navel. See the article **EXOMPHALUS**.

**EPIPLOON**, the same with what is otherwise called omentum. See **OMENTUM**.

**EPILOSARCOMPHALUS**, in surgery, a kind of exomphalus. See the article **EXOMPHALUS**.

**EPISARCIDIUM**, a term antiently used for the anasarca. See **ANASARCA**.

**EPISCOPACY**, the quality of episcopal government, or that form of church discipline, wherein diocesan bishops are established distinct from and superior to priests or presbyters. See **BISHOP**.

**EPISCOPAL**, something belonging to bishops. See the articles **BISHOP** and **EPISCOPACY**.

**EPISCOPALIANS**, in church-history, an appellation given to those who prefer the episcopal government and discipline to all others.

By the test act, none but episcopalians, or members of the church of England, are qualified to enjoy any office civil or military. See the article **TEST**.

**EPISCOPUS**, **BISHOP**. See **BISHOP**.

**EPISODE**, *ἐπισόδιον*, in poetry, a separate incident, story, or action, which a poet invents, and connects with his principal action, that his work may abound with a greater diversity of events: though, in a more limited sense, all the particular incidents whereof the action or narration is compounded, are called episodes. See the articles **EPIC** and **TRAGEDY**.

The episode, in its original, was only something rehearsed between the parts of the chorus, or antient tragedy, for the diversion of the audience. Episodes serve to promote the action, to illustrate, embellish, and adorn it, and carry it to its proper period. Episodes are either absolutely necessary, or very requisite. All episodes are incidents, tho' all incidents are not episodes; because some incidents are not adventitious to the action, but make up the very form and series of it. Examples will clear up this distinction: the storm in the first *Æneid* of Virgil, driving the fleet on the coast of Carthage, is an incident, not an episode, because the hero himself and the whole body of his forces are concerned in it; and so it is a direct and not a collateral part of the main action. The adventures of Nisus and Euryalus, in the ninth *Æneid*, are episodes, not incidents, *i. e.* not direct parts of the main action.

It is particularly by the art of episodes that the great variety of matter which adorns a poem is brought into the principal action: but though the episodes are a kind of digression from the subject, yet they ought to have a natural relation to the principal action, never be far-fetched, and must be handled with judgment, to avoid confusion and burdening the subject with too much action. Without this restriction the episode is no longer probable, and there appears an air of affectation which becomes ridiculous. Aristotle calls all those fables episodic, which abound in episodes not necessarily nor properly connected with each other.

The

The most natural episodes are the properest to circumstantiate the principal actions, namely, the causes, the effects, the beginnings, and the consequences of it. Homer and Virgil have shewn their principal art in this particular: the action of the *Iliad* and that of the *Æneid* were in themselves exceeding short, but are so beautifully lengthened and diversified by the intervention of episodes, that they make up an agreeable story, sufficient to employ the memory without overcharging it. See the article **EPIC**.

Our noble poet Milton has excelled in this art; he has no other episodes than what naturally arise from the subject, and yet his poem of *Paradise Lost* is filled with a multitude of astonishing incidents. Those great actions, the battle of the angels, and the creation of the world, are by way of episode to this noble poem. With the like art, and in the same manner, in that part of it which regards the fall of man, he has related the fall of these angels who are his professed enemies; besides the many other beauties of such an episode, its running parallel with the great action of the poem, hinders it from breaking unity so much as another episode would have done, that had not so great an affinity with the principal subject.

**EPISODIC**, an epithet given epic poems swelled too much with episodes. See the preceding article.

**EPISPASTIC**, in medicine, a topical remedy, which being applied to the external parts of the body, attracts the humours to that part. See **VESICATORY**.

**EPISTATES**, in the athenian government, was the president of the *proedri*. See the article **PROEDRI**.

To the custody of this officer was committed the public seal, and the keys of the citadel and the public exchequer: this therefore was an office of so great trust and power, that no man was permitted by the laws to continue in it above one day, nor to be elected into it a second time. The *epistates* were elected by lot out of the *prytanes*. See the article **PRYTANES**.

*Epistates* was also the president of the assembly, chosen by lot out of the *proedri*, the chief part of whose office seems to have consisted in granting the people liberty to give their voices, which they were not permitted to do till he had given the signal. If the people were remiss in coming to the assemblies, the magistrates used

their utmost endeavours to compel them, for they shut up all the gates, that only excepted through which they were to pass to the assembly, and took care that all vendibles should be taken out of the market, that there might be nothing to divert them from appearing.

**EPISTEMONARCH**, in the antient greek church, an officer of great dignity, who had the care of every thing relating to faith, in the quality of censor. His office answered pretty nearly to that of master of the sacred palace at Rome.

**EPISTLE**, *επιστολη*, denotes the same with a missive letter; but is now chiefly used in speaking of antient writings, as the epistles of St. Paul, epistles of Cicero, epistles of Pliny, &c. See the article **LETTER**.

The epistles of St. Paul, which are fourteen in number, make part of the canon of the New Testament; besides which there is one general epistle of St. James, two of St. Peter, three of St. John, and one of St. Jude.

**Dedicatory EPISTLE**, in matters of literature. See **DEDICATION**.

**EPISTOLARY**, something belonging to an epistle. See the article **EPISTLE**.

The art of epistolary writing is acknowledged to be very entertaining and instructive. The Romans ranked it in the number of liberal and polite accomplishments. And, indeed, it enters so much into all the occasions of life, that no gentleman can avoid shewing himself in this kind of composition; the chief excellence of which consists in expressing ordinary occurrences, in an elegant and uncommon manner. However, it is proper to observe, that such is the nature of epistolary writings, in general, as unavoidably renders them obscure, since the writer passes by many things, as being well known to him to whom the letter is addressed, which must be laid open to a stranger, before he can fully comprehend what is said. Hence it is, that the epistles of the antients, whether sacred or profane, are so difficult to be understood.

**EPISTROPHE**, in rhetoric, a figure, wherein that which is supposed of one thing, is strongly affirmed of another: thus, *Are they Hebrews? so am I. Are they Israelites? so am I. Are they of the seed of Abraham? so am I, &c.*

**EPISTYLE**, in the antient architecture, a term used by the Greeks for what we call architrave, viz. a massive piece of stone or wood, laid immediately over the capital

tal of a column. See ARCHITRAVE and COLUMN.

**EPITAPH**, a monumental inscription in honour or memory of a person defunct, or an inscription engraven or cut on a tomb, to mark the time of a person's decease, his name, family; and, usually, some eulogium of his virtues, or good qualities.

The elegance of an epitaph, as well as an elegy, chiefly consists in an expressive brevity. The French have a proverb, *He lies like an epitaph*, by reason they sometimes give characters absolutely false. At Lacedæmon epitaphs were only allowed to those who died in battle. The rest of the Greeks allowed of epitaphs, the form of which was generally as follows:

ΝΙΚΩΝ ΖΗΝΩΝΟΣ  
ΧΡΗΣΤΕ ΧΑΙΡΕ.

Nicon, son of Zenon,  
Good man, happiness to you.

ΟΛΥΜΠΙΑΣ  
ΧΡΗΣΤΗ  
ΧΑΙΡΕ.

Olympia,  
Good woman,  
Happiness to you.

The Romans, in their epitaphs, introduced their dead speaking, as in the following, wherein the dead wife thus bespeaks her surviving husband:

*Immatura peri: sed tu, felicior, annos  
Vive tuos, conjux optime, vive meos.*

Sometimes the roman epitaphs were full of moral expressions, and adorned with fine carved work, &c. At the top they always had the words *DIIS MANIBUS*. It has been much disputed by learned men whether or no epitaphs were in use among the antient Hebrews: however this be, it is certain the Jews have, of a very antient date, received this custom, of which Buxtorf produces several instances.

**EPITASIS**, in antient poetry, the second part or division of a dramatic poem, wherein the plot, entered upon in the first part, or protasis, was carried on, heightened, and worked up, till it arrived at its state, or height, called catastasis. See **PROTASIS**, **CATASTASIS**, **DRAMA**, &c. In the epitalis, accidents, as they are called by the moderns, arise; all things are in confusion, and involved in doubts and difficulties. Vossius says, the epitalis is contained in the second, sometimes in the third and fourth, but very rarely any part of it in the fifth act: but Dr. Trap says,

that there is no act to which the epitalis is not suitable; nay, that some of it ought always to be in the fifth act.

It is the epitalis that supports the weight and burden of the poem; upon it the crisis of the action chiefly turns. This division of tragedy is laid aside in the modern drama, instead whereof plays are divided into acts. See the article **ACT**.

**EPITASIS**, in medicine, the increase of a disease, or beginning of a paroxysm, particularly in a fever. See **FEVER**.

**EPITHALAMIUM**, in poetry, a nuptial song, or composition, in praise of the bride and bridegroom, praying for their prosperity, for a happy offspring, &c.

Among the Greeks, the married couple were no sooner bedded, than the young men and maids gathered round the door, dancing and singing the epithalamium, shouting and stamping with their feet, with intention to drown the maid's cries.

When they returned again in the morning, to salute the married couple, they sung the *ἐπιθαλαμια ἐσπρινα*, so named from the design of them, which was to wake and arise the bridegroom and bride; as those sung the night before were designed to dispose them to sleep, and on that account, were termed *ἐπιθαλαμια κοιμήσια*.

**EPITHEM**, in pharmacy, a kind of fomentation, or remedy of a spirituous or aromatic kind, applied externally to the regions of the heart, liver, &c. to strengthen and comfort the same, or to correct some intemperature thereof. See the article **FOMENTATION**.

There are principally three kinds of these external applications, the liquid, the solid, and the soft or poultice-kind. The liquid epithems are sometimes considerably thick; but when they are intended to penetrate deep, they are much better if very thin and fluid. As to the part to which the epithem is immediately applied, it is not what it is always intended to act upon, as this frequently lies deep within: the epithems, therefore, intended for this purpose, should consist of the most penetrating ingredients, for which reason astringents and inspissating remedies can be of no use; but in this form hot wine alone is sometimes used as an epithem, and often such medicines as are not to be safely taken inwardly, such as highly rectified spirits, preparations, of lead, henbane, mandrake, and other poisonous plants, and the like: but we are carefully to remember in regard to these, that the pores are capable of absorbing them, and ought therefore



therefore to know the effects they are capable of producing, when thus absorbed in the body. As to the vehicles of the liquid epithems, they are various, as linen or woollen-cloths, silk, stapes, toast-bread, &c. They are in some cases to be applied hot, in others, cold : when the intention is to resolve, penetrate, and attract, then the hot are to be preferred ; but these are injurious to parts constricted by intense cold.

The dry epithems are medicated powders, usually sewed up in a cloth, and applied to different parts of the body ; for which purpose the powders must be coarse. Sometimes the liquid epithems are added to the dry, to reduce the whole to a consistence, such as may be spread upon cloth, and applied.

**Volatile EPITHEM**, is a form of medicine prescribed in the London dispensatory, ordered to be made up of equal weights of common turpentine and spirit of sal armoniac, by stirring them together in a mortar.

**EPITHEM**, in poetry and rhetoric, an adjective expressing some quality of a substantive to which it is joined ; or such an adjective as is annexed to substantives by way of ornament and illustration, not to make up an essential part of the description. Nothing, says Aristotle, tires the reader more than too great a redundancy of epithets, or epithets placed improperly ; and yet nothing is so essential in poetry as a proper use of them. The writings of the best poets are full of them, especially Virgil.

We may distinguish two kinds of epithets, viz. 1. Those which add a new idea quite distinct from the general nature of a substantive. Thus Virgil in his Georgics,

*Inter cunctantes cecidit moribunda missis.*

And, 2. Those that bring with them some light and ornament, but not new ideas. Thus the same poet,

*Timidi damæ, corvique fugaces.*

The first kind of epithets entertain the mind with a more agreeable variety, but those of the second require, perhaps, more care and judgment in the proper choice of them. For instance, because Virgil has said, *the fearful deer and fleeting fags*, it by no means follows that these epithets are applicable whenever fags and deer shall happen to be mentioned. They are proper in the place where he uses them, but may not be so always.

**EPITHYME**, *epithymum*, the name by which some call the cuscuta, or dodder.

**EPITOME**, in literary history, an abridgment or summary of any book, particularly of a history. See **ABRIDGMENT**. It is pretended that the epitomizing of authors, frequently occasions the loss of the originals. Thus the loss of Pompeius Trogus, is ascribed to his epitomiser Justin ; and the loss of a great part of Livy, to Lucius Annæus Florus.

**EPITRITUS**, in prosody, a foot consisting of three long syllables and one short. Of these, grammarians reckon four kinds ; the first consisting of an iambus and spondee, as *salūtāntēs* : the second, of a trocheus and spondee, as *cōncitātī* : the third, of a spondee and an iambus, as *cōmmūcāns* : and the fourth, of a spondee and trocheus, as *incāntārē*. See the articles **SPONDEUS**, **TROCHEUS**, &c.

**EPITROPE**, in rhetoric, a greek term for the same figure which the Latins call *concessio*. See the article **CONCESSION**.

**EPITROPUS**, among the modern Greeks, a kind of arbitrator chosen by the greek christians under the dominion of the Turks, to terminate their differences, and avoid carrying them before the turkish magistrates. See **ARBITRATOR**.

**EPIZEUXIS**, in rhetoric, a figure which repeats the same word, without any other intervening : such is that of Virgil, *nunc, nunc, insurgite remis*.

**EPLYE**, in heraldry, the same with displayed. See the article **DISPLAYED**.

**EPOCH**, in chronology, a term or fixed point of time, whence the succeeding years are numbered or accounted. See the article **ÆRA**.

The most remarkable epochas are those that follow.

**EPOCH** of the creation of the world. According to the vulgate, archbishop Usher places this event 4004 years before the birth of Christ ; Scaliger makes it 3950 ; Petavius, 3984 ; and Ricciolus, 4184 years before Christ. According to the septuagint, Eusebius places the creation 5200 years before the nativity of our Lord ; the alphonine tables, 6934 ; and Ricciolus, 5634. The creation, therefore, as we follow the archbishop, happened in the year 710 of the julian period. See the article **JULIAN PERIOD**.

Sir Isaac Newton, again, makes the creation of the world later by 500 years than all other chronologists ; and the proofs by which this illustrious philosopher supports

ports his opinion, are of two different kinds. The Egyptians counted 341 generations from Menes to Setho, allowing an hundred years for three generations; and the antient Greeks computed one generation at about forty years. Now, says Sir Isaac, it is true, three ordinary generations may be computed at about 120 years; but generations are longer than the reigns of kings, because it is evident that mankind in general live longer than kings. The duration of a reign, therefore, taking one with another, is, according to him, about twenty years; whence he concludes, that the antients have erred in their calculation in allowing forty years for every generation. The second kind of proof is taken from the precession of the equinoxes. See PRECESSION, &c. According to Clemens Alexandrinus, Chiron, who was in the expedition of the argonauts, fixed the vernal equinox at the fifteenth degree of aries, and consequently the summer solstice at the fifteenth degree of cancer. Meto fixed the summer solstice at the eighth degree of cancer, a year before the peloponnesian war. Now since one degree answers to the retrograde motion of the equinoctial points in 72 years, there are seven times 72 years from the expedition of the argonauts to the beginning of the peloponnesian war; that is 504 years, and not 507 years, as the Greeks affirm. By combining these two different proofs, Sir Isaac concludes, that the expedition of the argonauts ought to be placed 909 years before Jesus Christ, and not 1400, as is generally believed; and therefore that the creation of the world ought to be placed about 500 years later than chronologists generally place it.

**EPOCHA of the deluge.** According to the hebrew text, there are 1656 years from the creation to the deluge; 1307, according to the Samaritan; 2242, according to Eusebius and the Septuagint; 2256, according to Josephus and the Septuagint, and 2262, according to Julius Africanus, Petavius, and the Septuagint. In following the hebrew text, this epocha begins in the year 2366 of the julian period.

**EPOCHA of the olympiads,** used principally by the Greeks, had its origin from the olympic games, which were celebrated at the beginning of every fifth year. This epocha begins 776 years before the incarnation, or in the 3938 of the julian period.

**Varronian EPOCHA of the building of Rome,** is fixed 753 years before our Saviour's birth, and in the 3961 of the julian period.

**EPOCHA of Nabonassar king of Babylon,** made use of by Ptolemy, Censorinus, and several other authors, began 747 years before the incarnation, and in the 3967 of the julian period.

**Julian EPOCHA.** The first year of Julius Cæsar's correcting the calendar stands 45 years before our Saviour's birth, and coincides with the 4669 of the julian period.

**EPOCHA of Christ.** The christian world generally reckoned from the epocha of the creation, the building of Rome, the consuls register, or the emperor's reign, till about 500 years after Christ, when the epocha of the nativity of our blessed Lord was introduced by Dionysius Exiguus. He began his account from the conception or incarnation properly called Lady-day. Most countries in Europe, however, at present reckon from the first of January next following, except the court of Rome, where the epocha of the incarnation still obtains for the date of their bulls and briefs. But here we are to observe, that there are different opinions touching the year of our Saviour's birth. Capellus and Kepler fix it at about the 748th year from the building of Rome. Decker and Petavius place the incarnation in the 749th of Rome. Scaliger and Vossius make it fall on the 751st of Rome. Dionysius Exiguus, Bede, &c. fix the birth of our Saviour to the year 751 of Rome; the diversity of these opinions proceeding from the difficulty of fixing Herod the great's death, who, as is evident from the evangelists, was living at our Saviour's birth, the taxation of Cyrenius, and the time of our Saviour's beginning his ministry. But let this be as it will, it is generally agreed, that as to computation and use, the common epocha is to be followed, which places the birth of Christ in the 4713th of the julian period, although the true birth rather corresponds with the 4711th of the same period.

**Dioclesian EPOCHA, or EPOCHA of martyrs,** called also the æra of the copti or Egyptians, because the emperor Dioclesian made a great many martyrs in Egypt, begins in the year 283 of our lord, and the 4997 of the julian period.

**EPOCHA of the begira, or flight of Mahomet,** used among the Turks, is the year of the julian period 5335, answering to the year of Christ 622.

*Yezdejerd*, or *Persian* EPOCHA, is the year of the julian period, 5345, answering to the year 622.

To reduce the years of one epocha to those of another, observe the following rule: add the given year of an epocha to the year of the julian period corresponding with its rise, and that will give the year of the period.

For example, if to 1754, the present year of the christian epocha, we add 4713, the year of the julian period corresponding with its rise, the sum, 6467, will be the present year of the julian period: now if we subtract from the year thus found, the year of the julian period corresponding with the rise of any epocha, the remainder shews the true method of making a just connexion betwixt that epocha and the known year of Christ.

Again, if we want to find the year of the julian period corresponding to a given year before Christ, we subtract the given year from 4714, and the remainder is the year required.

*Spanish* EPOCHA. See the article *ÆRA*.

EPODE, in lyric poetry, the third or last part of the ode, the antient ode being divided into strophe, antistrophe, and epode. See the articles *ODE*, &c.

The epode was sung by the priests, standing still before the altar, after all the turns and returns of the strophe and antistrophe, and was not confined to any precise number or kind of verses.

The epode is now a general name for all kinds of little verses that follow one or more great ones, of what kind soever they be; and in this sense, a pentameter is an epode after an hexameter. And as every little verse, which being put after another, closes the period, is called epode; hence the sixth book of Horace's odes is entitled *Liber Epodon*, Book of Epodes, because the verses are all alternately long and short, and the short ones generally, though not always, close the sense of the long one.

EPOMIS, in anatomy, a muscle, otherwise called deltoides. See *DELTOIDES*.

EPOPS, in ornithology, the variegated upupa. See the article *UPUPA*.

EPOPOEIA, in poetry, the story, fable, or subject treated of, in an epic poem. See the article *FABLE*.

The word is commonly used for the epic poem itself. See *EPIC POEM*.

EPOTIDES, in the naval architecture of the antients, two thick blocks of wood,

one on each side the prow of a galley, for warding off the blows of the rostra of the enemy's vessels. See *GALLEY* and *ROSTRUM*.

EPINGEN, a town of Germany, situated about ten miles north of Hailbron.

EPSOM, a town of Surry, about fifteen miles south-west of London; much resorted to on account of its medicinal waters; from which the bitter purging salt being first extracted, got the name of Epsom-salt. At present, however, the bitter purging salt is procured from the bittern, remaining after the crystallization of common salt; and this is found to answer all the purposes of that first obtained from Epsom-waters, and goes by its name.

Epsom-salt is esteemed good in colics, the scurvy, diabetes, loss of appetite, the rheumatism, jaundice, hypochondriac affection, and other chronic complaints. The best way of taking it is with any chalybeate waters, as those of Tunbridge; for instance, a dram, or a dram and an half, dissolved in the three or four first draughts.

EPTACTIS, in zoology, a species of star-fish, with seven rays. See the article *STAR-FISH*.

EPULIDES, or PARULIDES, in surgery. See the article *PARULIDES*.

EPULONES, in roman antiquity, ministers who assisted at the sacrifices, and had the care of the sacred banquet committed to them. At first they were only three in number, but afterwards increased to seven. Their office was, to give notice when feasts were to be held in honour of the gods; and, to take care that nothing was wanting towards the celebration.

EPULOTICS, *ἐπιλοτικά*, the same with cicatrizants. See *CICATRIZANTS*.

EQUABLE, an appellation given to such motions as always continue the same in degree of velocity, without being either accelerated or retarded.

When two or more bodies are uniformly accelerated or retarded, with the same increase or diminution of velocity in each, they are said to be equably accelerated or retarded.

EQUAL, a term of relation between two or more things of the same magnitude, quantity, or quality.

Mathematicians speak of equal lines, angles, figures, circles, ratios, solids, &c. See the articles *LINE*, *ANGLE*, &c.

EQUALITY,

**EQUALITY**, that agrément between two or more things, whereby they are denominated equal.

The equality of two quantities, in algebra, is denoted by two parallel lines placed between them: thus,  $4 + 2 = 6$ , that is, 4 added to 2, is equal to 6.

**EQUANIMITY**, in ethics, denotes that even and calm frame of mind and temper, under good or bad fortune; whereby a man appears to be neither puffed up, or overjoyed with prosperity; nor dispirited, soured, or rendered uneasy by adversity. See the articles **ETHICS** and **PASSIONS**.

**EQUANT**, in the old astronomy, a circle described on the center of the deferent, for accounting for the excentricity of the planets. See **EXCENTRICITY**.

**EQUATION**, in algebra, the mutual comparing two equal things of different denominations, or the expression denoting this equality; which is done by setting the one in opposition to the other, with the sign of equality ( $=$ ) between them: thus  $3s = 36d$ , or  $3 \text{ feet} = 1 \text{ yard}$ . Hence, if we put  $a$  for a foot, and  $b$  for a yard, we will have the equation  $3a = b$ , in algebraical characters.

When a problem is proposed to be resolved by means of equations, the first thing to be done is to form a clear conception of the conditions and nature of it; taking care to substitute the first letters of the alphabet for known quantities, and the last letters of the alphabet for unknown ones. Then by due reasoning from the conditions of the question, let the quantities concerned therein be justly stated, and carefully compared; so that their relation to one another may appear, and the difference, which renders them unequal, be discovered; and, consequently, the same thing found expressible two ways, or brought into an equation, or several equations independent on each other. And here it is to be observed, 1. That if there are as many equations given, as there are quantities sought, then the question has a determinate number of solutions, or is truly limited, *viz.* each quantity sought hath but one single value. Thus, suppose a question proposed concerning the age of three persons, was conditioned as follows, *viz.* the second is seven years older than the first, the age of the third is triple that of the first and second, and the sum of all their ages is 68. Required the age

of each. In order to bring this question to an equation, put  $z$  for the age of the first; then will the age of the second be  $z + 7$ , and the age of the third  $6z + 12$ : the sum of all their ages  $z + z + 7 + 6z + 12 = 68$ . So that here is but one equation given, and one quantity required, *viz.* the age of the first. 2. When the number of the quantities sought exceed the number of the given equations, the question is capable of an indeterminate number of answers; and, therefore, can be but imperfectly determined.

**Reduction of EQUATIONS**. If the question, when stated, is found to have a determinable number of solutions, then the equation, directly drawn from the conditions of the question, must be reduced into another, by equal augmentation and diminution; so that the known quantities may stand on one side, and one of the unknown quantities, or some power of it, on the other side of the equation. This is called reduction of equations, and depends upon a right application of the five following axioms: 1. If equal quantities be added to equal quantities, the sum of those quantities will be equal. 2. If equal quantities be subtracted or taken from equal quantities, the quantities remaining will be equal. 3. If equal quantities be multiplied by equal quantities, their products will be equal. 4. If equal quantities be divided by equal quantities, their quotients will be equal. 5. Quantities that are equal to one and the same thing, are also equal to one another.

If these axioms be well understood, the reduction of equations will appear very plain, and the operations be easily performed. 1. Reduction by transposition, is performed by transferring a quantity to the other side of the equation with a contrary sign; or by equal addition, if the quantity be negative; and by equal subtraction, if affirmative. Thus the equation  $x - 10 = 40$ , is reduced by adding  $+ 10$  to each side, and the result will be the same as if  $- 10$  had been transposed to the opposite side with the contrary sign; for  $x - 10 + 10 = 40 + 10$ , is the same with  $x = 40 + 10$ , the  $- 10$  and  $+ 10$  destroying each other. In the same manner  $x + 10 = 40$ , is reduced to  $x = 40 - 10$ , by transposing the  $+ 10$  with a contrary sign. 2. Reduction is performed by equal multiplication, in case there are fractional quantities; for by multiplying every

every term in the equation by the denominators of the fractions, it will be cleared of fractions: thus by multiplying every

term of the equation  $\frac{z}{a} = b$  by the denominator  $a$ , we will have  $z = ab$ . Again,

if  $\frac{z^3 + 3a^2}{c} + n + a = z + a$ ; then by

multiplying by the denominator  $c$ , we will have an equal equation free from fractions, *viz.*  $z^3 + 3a^2 + cn + ac = cz + ac$ , or  $z^3 + 3a^2 + cn = cz$ , the  $ac$  on each side being rejected. 3. By equal division, as in the equation  $ax = c$ ; for

by dividing each side by  $a$ , we will have

$x \left( \text{or } \frac{ax}{a} \right) = \frac{c}{a}$ . In the same manner,

in the equation  $ax + ez = cb$ , by dividing each side by  $a + e$ , we get the equation

$z = \frac{cb}{a + e}$ . 4. Equations are cleared of surd quantities by involution: thus,

if the equation be  $\sqrt{a} = 6$ ; then by involution or squaring each side of the equation, we have the equation  $a = 36$ . If

both sides be similar surds, or of the same power, all that we have to do is to reject

the radical sign: thus, for  $\sqrt{a} = \sqrt{d + c}$ ,

we write  $a = d + c$ , rejecting the radical sign of both. 5. When any single power

of the unknown quantity is on one side of the equation, evolve or extract the

root of both sides, according as the index of that power denotes, and their roots

will be equal. Thus if  $zz = 25$ , by extracting the root of each side we have

$z = 5$ . In the same manner, if  $aaa = 27$ , their cube roots will be equal, *viz.*

$a = 3$ . Or, if any compound power of an equation, that hath a true root of its

kind; then, by evolving both sides of the equation, it will be expressed in lower

terms: for example,  $a^2 + 2ba + b^2 = d^2$ , by evolving both sides, comes out

$a + b = d$ . 6. A proportion may be converted into an equation, asserting the product

of the extremes to be equal to that of the means; or, any one of the extremes

may be made equal to the product of the means divided by the other extreme: thus, if  $12 - x : \frac{x}{2} :: 4 : 1$ , then

$12 - x = 2x$ ; and by transposing the

$-x$ , we will have  $3x = 12$ , and dividing by 3,  $x = \frac{12}{3} = 4$ , by the preceding

rules. 7. If any quantities be found on

both sides of the equation, with the same sign prefixed, they may be taken away from both: thus, for  $3x + b = a + b$ , we say

$3x = a$ . Also, if all the quantities of the equation be multiplied or divided by

the same quantity, it may be struck out of them all: thus, if  $3ax + 5ab = 8ac$ ,

dividing by  $a$ , we have  $3x + 5b = 8c$ ; and transposing  $5b$  and dividing by 3,

we have  $x = \frac{8c - 5b}{3}$ , according to the

first and third rules. 8. Instead of any quantity in an equation, you may substitute another equal to it: thus, if  $3x + y$

$= 24$ , and  $y = 9$ ; then  $3x + 9 = 24$ ,

or  $x = \frac{24 - 9}{3} = 5$ .

*Solution of simple EQUATIONS.* 1. After an equation is formed, if you have only

one unknown quantity, then, by the preceding rules, bring it to stand alone on

one side, so as to have none but known quantities on the other side; by which

means you will discover its value. Thus, if the question proposed be that of the

three persons ages already mentioned, the equation thence resulting has been

found to be as in

#### Example I.

By quest.	1	$  z + z + 7 + 6z + 21 = 68$
1 transp.	2	$  8z = 68 - 28 = 40$
$2 \div 8$	3	$  z = \frac{40}{8} = 5 = \text{first age.}$
Hence	4	$  z + 7 = 12 = \text{second age.}$
And	5	$  12 + 5 \times 3 = 51 = \text{third age.}$

#### Example II.

$$\frac{3x}{4} \times \frac{x}{12} = x$$

$$\frac{3x^2}{48} = x$$

and  $3x^2 = 48x$  by the second rule.

and  $3x = 48$  by the seventh rule.

and  $x = \frac{48}{3} = 16$  by the third rule.

2. If there are two unknown quantities, then there must be two equations arising from the conditions of the question; suppose  $x$  and  $y$ . The rule is, to find a value of  $x$  or  $y$  from each of the equations, and then by putting these two values equal to each other, there will arise a new equation involving only one un-

known quantity, which must be reduced by the same rules as formerly.

Example: let the sums of two quantities be  $s$ , and their difference  $d$ ; let  $s$  and  $d$  be given, and let it be required to find the

$$\begin{array}{l} x+y=s \\ x-y=d \\ \hline x=s-y \\ x=d+y \\ s-y=d+y \\ 2y=s-d \\ y=\frac{s-d}{2} \\ \hline x=\frac{s+d}{2} \end{array} \quad \begin{array}{l} \text{quantities themselves. Suppose the quantities to be } x \text{ and } y; \text{ then, by the question, } x+y=s, \text{ and } x-y=d; \text{ whence } x=s-y=d+y; \text{ and, by transposition, } 2y=s-d; \text{ so that dividing by 2, we have } y=\frac{s-d}{2}; \text{ and by comparing the value of } x, \text{ viz. } s-y, \end{array}$$

we find  $x=s-\frac{s-d}{2}$ , or  $2x=2s-s+d$ ,

and dividing by 2, the value of  $x=\frac{s+d}{2}$ , as expressed in the margin.

3. When in one of the given equations, the unknown quantity is of one dimension, and in the other of a higher dimension; you must find a value of the unknown quantity from that equation where it is of one dimension, and then raise that value to the power of the unknown quantity in the other equation; and by comparing it, so involved, with the value you deduce from that other equation, you will obtain an equation that will have only one unknown quantity and its powers: that is, when you have two equations of different dimensions, if you cannot reduce the higher to the same dimension with the lower, you must raise the lower to the same dimension with the higher.

Example: the sum of two quantities,

$$\left. \begin{array}{l} x+y+z=12 \\ x+2y+3z=20 \\ \frac{x}{3}+\frac{y}{2}+z=6 \end{array} \right\} \text{ then } x=\left\{ \begin{array}{l} 12-y-z \\ 20-2y-3z \\ 18-\frac{3y}{2}-3z \end{array} \right\} \left\{ \begin{array}{l} \text{first} \\ \text{second} \\ \text{third} \end{array} \right\} \text{ value}$$

$$\begin{array}{l} 12-y-z=20-2y-3z \\ 12-y-z=18-\frac{3y}{2}-3z \end{array}$$

These two last equations involve only  $y$  and  $z$ , and are to be resolved by the second direction. Thus,

$$\begin{array}{l} \{ 2y-y+3z-z=20-12=8 \\ \{ y+2z=8 \\ \{ 36-3y-6z=24-2y-2z \\ \{ 12=y+4z \\ \text{whence } y=\left\{ \begin{array}{l} 8-2z \text{ first} \\ 12-4z \text{ second} \end{array} \right\} \text{ value} \end{array}$$

and the difference of their squares, being given, to find the quantities themselves. Suppose them to be  $x$  and  $y$ , their sum  $s$ , and the difference of their squares  $d$ . Then,

$$\begin{array}{l} x+y=s \\ x^2-y^2=d \\ \hline x=s-y \\ x^2=s^2-2sy+y^2 \\ x^2=d+y^2, \text{ whence} \\ d+y^2=s^2-2sy+y^2 \\ d=s^2-2sy \\ 2sy=s^2-d \\ y=\frac{s^2-d}{2s} \\ \text{and } x=\frac{s^2+d}{2s} \end{array}$$

4. If there are three unknown quantities, there must be three equations in order to determine them, by comparing which you may, in all cases, find an equation involving only one unknown quantity; which may be resolved by the rules for reduction of equations already mentioned.

From three equations involving any three unknown quantities,  $x$ ,  $y$ , and  $z$ , to deduce two equations involving only two unknown quantities, the following rule will always serve: find three values of  $x$  from the three given equations; then, by comparing the first and second value, you will find another equation involving only  $y$  and  $z$ : again, by comparing the first and third, you will find another equation involving only  $y$  and  $z$ ; and, lastly, those equations are to be solved by the second direction.

Example: suppose

$$\begin{array}{l} x+y+z=12 \\ x+2y+3z=20 \\ \frac{x}{3}+\frac{y}{2}+z=6 \end{array} \left\{ \begin{array}{l} \text{first} \\ \text{second} \\ \text{third} \end{array} \right\} \text{ value}$$

$$\begin{array}{l} 12-y-z=20-2y-3z \\ 12-y-z=18-\frac{3y}{2}-3z \\ 8-2z=12-4z \\ 2z=12-8=4 \\ z=\frac{4}{2}=2 \\ y=(8-2z)=4 \\ x=(12-y-z)=6 \end{array}$$

This method is general, and will extend to all equations that involve three unknown quantities; but there are often easier and shorter methods, to deduce an equation

equation involving only one unknown quantity, which is best learned from practice.

*Solution of quadratic EQUATIONS.* 1. If, after the equation is reduced as directed above, and the unknown quantity brought to stand on one side, it is found to be a simple square power, all that you have to do is to evolve both sides of the equation, by which means you will find the value of the simple unknown quantity. Thus, if  $x^2 = 36$ ; then, by evolution or extraction,  $x = 6$ . See EXTRACTION.

2. In the solution of any question, where you have got an equation that involves only one unknown quantity, but involves at the same time the square of that quantity, and the product of it multiplied by some known quantity; then you have what is called an affected quadratic equation, which may be resolved by the following rules: 1. Transpose all the terms

that involve the unknown quantity to one side, and the known terms to the other side of the equation. 2. If the square of the unknown quantity is multiplied by any coefficient, you are to divide all the terms by that coefficient, that the coefficient of the square of the unknown quantity may be unit. 3. Add to both sides the square of half the coefficient prefixed to the unknown quantity itself, and the side of the equation that involves the unknown quantity will then be a complete square. 4. Extract the square root from both sides of the equation, which you will find, on one side, always to be the unknown quantity with half the foresaid coefficient subjoined to it; so that by transposing this half, you may obtain the value of the unknown quantity expressed in known terms. Thus, suppose the quadratic to equation be,

$$y^2 + ay = b$$

Add the square of  $\frac{a}{2}$  to both sides,

$$y^2 + ay + \frac{a^2}{4} = b + \frac{a^2}{4}$$

Extract the root,

$$y + \frac{a}{2} = \pm \sqrt{b + \frac{a^2}{4}}$$

Transpose  $\frac{a}{2}$ , and

$$y = \sqrt{b + \frac{a^2}{4}} - \frac{a}{2}$$

Here it is to be observed, that the square root of any quantity, as  $+a^2$ , may be  $+a$ , or  $-a$ ; and hence all quadratic equations admit of two solutions. Also, since the squares of all quantities are positive, it is evident that the square root of a negative quantity is imaginary, and cannot be assigned. However, the following examples will illustrate the rules for quadratic equations.

Example I. The sum of two quantities is 32, and their product 240; required the quantities themselves. Suppose them to be  $x$  and  $y$ ; then

$$x + y = 32; \text{ and } x = 32 - y$$

$$xy = 240; \text{ and } x = \frac{240}{y}$$

$$\text{therefore } 32 - y = \frac{240}{y}$$

Suppose	1	$x, y, z$ , to represent each man's stock,
Then	2	$x + y + z = s$ = the whole stock,
	3	$s + 48$ = the whole gain.
By the question	4	$x + 13 = y$
	5	$y + z = 175$
	6	$x + y + z = 175 + x$

$$\begin{aligned} \text{and } 32y - y^2 &= 240 \\ \text{transpose, } y^2 - 32y &= -240 \\ \text{add } 16^2, y^2 - 32y + 256 &= -240 + 256 \\ \text{extract } \sqrt{\phantom{x}}, y - 16 &= \pm \sqrt{16} \\ \text{and } y &= \pm \sqrt{16} + 16 = 20 \\ x (= 32 - y) &= 12 \end{aligned}$$

Example II. Three merchants join stocks; the stock of the first was less than that of the second by 13 l. and the sum of the second and third man's stock amounted to 175 l. In trading they gained 48 l. more than their whole stock was; and the first man's share of the gain was 78 l. required each man's stock and share of the gain?

2, 6	7	$5 = 175 + x$
7, 3	8	$5 + 48 = 223 + x$
By the question	9	$175 + x = 223 + x : x : 78$
9 x	10	$x^2 + 223x = 78x + 13650$
10 - 78x	11	$x^2 + 145x = 13650$
11 □	12	$x^2 + 145x + 5256,25 = 18906,25$
12 $600^2$	13	$x + 72,5 = \sqrt{18906,25} = 137,5$
13 - 72,5	14	$x = 137,5 - 72,5 = 65$
14,4	15	$y = x + 13 = 78$
5,15	16	$z = 175 - y = 97$
Then	17	$65 + 78 + 97 + 48 = 288$ the whole gain
And	18	$y$ 's gain = 93 l. 12 s. and $z$ 's = 116 l. 8 s.

*Solution of cubic EQUATIONS.* The second term of a cubic equation can be taken away, so that it will be transformed to this form  $x^3 + qx + r = 0$ . See the article TRANSFORMATION.

Let us suppose that  $x = a + b$ ; and  $x^3 + qx + r = a^3 + 3a^2b + 3ab^2 + b^3 + qx + r = a^3 + 3ab \times a + b + b^3 + qx + r = a^3 + 3abx + b^3 + qx + r =$  (by supposing  $3ab = -qa^3 + b^3 + r = 0$ . But

$$b = -\frac{q}{3a}, \text{ and } b^3 = -\frac{q^3}{27a^3}, \text{ and con-}$$

$$\text{sequently } a^3 - \frac{q^3}{27a^3} + r = 0; \text{ or, } a^6 +$$

$$ra^3 = \frac{q^3}{27}. \text{ Suppose } a^3 = z, \text{ and you}$$

$$\text{have } z^2 + rz = \frac{q^3}{27}; \text{ which is a quadra-}$$

tic, the resolution whereof gives

$$z = -\frac{1}{2}r \pm \sqrt{\frac{1}{4}r^2 + \frac{q^3}{27}} = a^3, \text{ and}$$

$$a = \sqrt[3]{-\frac{1}{2}r \pm \sqrt{\frac{1}{4}r^2 + \frac{q^3}{27}}}; \text{ and}$$

$$x = a + b = a - \frac{q}{3a} = \sqrt[3]{-\frac{1}{2}r \pm \sqrt{\frac{1}{4}r^2 + \frac{q^3}{27}}} -$$

$$\frac{q}{3 \times \sqrt[3]{-\frac{1}{2}r \pm \sqrt{\frac{1}{4}r^2 + \frac{q^3}{27}}}}$$

in which expressions there are only known quantities. This method is commonly called Cardan's rule.

But when, in a cubic equation  $x^3 - qx \pm r$ ,  $q$  is negative; in this case the expression  $\sqrt{\frac{1}{4}r^2 + \frac{1}{27}q^3}$ , will be transformed into  $\sqrt{\frac{1}{4}r^2 - \frac{1}{27}q^3}$ ; which root becomes impossible, or imaginary, when  $\frac{1}{27}q^3$  is greater than  $\frac{1}{4}r^2$ , as being the square root of a negative quantity. And yet, even in this case, the root  $x$  may be a real quantity; though algebraists have not, hitherto, been able to find a real expression of its value. See the article IRREDUCIBLE.

Again, any cubic equation may be reduced to this form, and the value of  $x$  discovered, without exterminating the second term.

$$x^3 - 3px^2 - 3qx - 2r \left. \begin{matrix} + 3p^2x - p^3 \\ + pq \end{matrix} \right\} = 0; \text{ which}$$

by supposing  $x = z + p$ , will be reduced to  $z^3 - 3qz - 2r = 0$ , in which the second term is wanting. But, from what is advanced above, it follows that  $z = \sqrt[3]{r + \sqrt{r^2 - q^3}} + \sqrt[3]{r - \sqrt{r^2 - q^3}}$  (if you suppose that the cubic root of the binomial  $r + \sqrt{r^2 - q^3}$  is  $m + \sqrt{n}$ )  $= m + \sqrt{n} + m - \sqrt{n} = 2m$ . And, since  $x = z + p$ , it follows that  $x = p + 2m$ . But, as the square root of any quantity is twofold, so the cubic root is threefold, and can be expressed three different ways. See the article ROOT.

Example: let it be required to find the roots of the equation  $x^3 - 12x^2 + 41x - 42 = 0$ .

Comparing



Comparing the coefficients of this equation with these of the general equation, viz.

$$x^3 - 3px^2 - 3q \left\{ \begin{array}{l} x - 2r \\ + 3p^2 \end{array} \right\} x - p^3 \left\{ \begin{array}{l} - 2r \\ + 3pq \end{array} \right\} = 0, \text{ you}$$

will find,  $3p = 12$ , so that  $p = 4$ ;  $3p^2 - 3q (= 48 - 3q) = 41$ , so that  $q = \frac{7}{3}$ ;

$$1^\circ. x = p + 2m = 4 - 2 = 2.$$

$$2^\circ. x = p - m - \sqrt{-3n} = 4 + 1 - \sqrt{4} = 5 - 2 = 3.$$

$$3^\circ. x = p - m + \sqrt{-3n} = 5 + 2 = 7.$$

So that the three roots of the proposed equation are 2, 3, and 7.

**Solution of biquadratic EQUATIONS.** The roots of these may be found by reducing them to cubic ones, thus:

Let the second term be taken away, as directed under the article TRANSFORMATION of equations.

And let the equation that results, be  $x^4 + qx^2 + rx + s = 0$ . Suppose this biquadratic to be the product of these two quadratic equations,

$$x^2 + ex + f = 0.$$

$$x^2 - ex + g = 0$$

$$x^4 + \left\{ \begin{array}{l} f \\ + g \end{array} \right\} x^2 + \left\{ \begin{array}{l} ex - ef \\ - e^2 \end{array} \right\} x + fg = 0.$$

Where  $e$  is the coefficient of  $x$  in both equations, but affected with contrary signs; because when the second term is wanting in an equation, the sum of the affirmative roots must be equal to the sum of the negative.

Compare now the proposed equation with the above product, and the respective terms put equal to each other, will give  $f + g - e^2 = q$ ,  $eg - ef = r$ , and  $fg = s$ . Whence it follows, that  $f + g = q + e^2$ , and

$$g - f = \frac{r}{e}; \text{ and consequently, } f + g$$

$$+ g - f (= 2g) = q + e^2 + \frac{r}{e}, \text{ and } g =$$

$$\frac{q + e^2 + \frac{r}{e}}{2}. \text{ In the same manner you}$$

will find, by subtraction, &c.  $f =$

$$\frac{q + e^2 - \frac{r}{e}}{2}, \text{ and } f \times g (= s) = \frac{1}{4} \times q^2 +$$

$$\frac{2qe^2 + e^4 - \frac{r^2}{e^2}}{2}; \text{ and, multiplying by}$$

$4e^2$ , and ranging the terms, you have

$$\text{this equation, } e^6 + 2qe^4 + q^2 - 4s \times e^2 - r^2 = 0. \text{ Suppose } e^2 = y, \text{ and it be-}$$

comes  $3pq - p^3 - 2r (= 12 \times \frac{7}{3} - 4^3 - 2r) = 42$

so that  $r = 3$ . And consequently  $r^2 =$

$$9 = 9 - \frac{3 \times 7}{2} = -\frac{120}{2}, \text{ and } r + \sqrt{r^2 - q^3}$$

$$= 3 + \sqrt{-\frac{120}{2}}. \text{ Now the cubic root of}$$

this binomial is found to be  $-1 +$

$$\sqrt{-\frac{4}{3}} (= m + \sqrt{n}); \text{ whence}$$

comes  $y^3 + 2qy^2 + q^2 - 4s \times y - r^2 = 0$ ,

an equation whose roots are to be discovered by the method of resolving cubic equations.

Then the values of  $y$  being found, their

square roots will give  $e$  (since  $y = e^2$ );

and having  $e$ , you will find  $f$  and  $g$ ,

$$\text{from the equations } f = \frac{q + e^2 - \frac{r}{e}}{2}, \text{ and}$$

$$g = \frac{q + e^2 + \frac{r}{e}}{2}. \text{ Lastly, extracting the}$$

roots of the roots of the equations  $x^2 + ex +$

$f = 0$ , and  $x^2 - ex + g = 0$ , you will find

the four roots of the biquadratic  $x^4 +$

$qx^2 + rx + s = 0$ ; for either  $x = -$

$$\frac{1}{2}e \pm \sqrt{\frac{1}{4}e^2 - f}, \text{ or } x = \frac{1}{2}e \pm \sqrt{\frac{1}{4}e^2 - g}.$$

Or you may find the roots of a biquadratic,

without taking away the second term.

Suppose it to be of this form,

$$x^4 - 4px^3 - 2q \left\{ \begin{array}{l} x^2 - 8r \\ + 4p^2 \end{array} \right\} x - 4s \left\{ \begin{array}{l} x^2 - 4p^2 \end{array} \right\} = 0.$$

then the values of  $x$  will be

$$x = p - a \pm \sqrt{p^2 + q - a^2 - \frac{2r}{a}}$$

$$\text{and } x = p + a \pm \sqrt{p^2 + q - a^2 + \frac{2r}{a}}$$

where  $a^2$  is equal to the root of the cubic equation

$$y^3 - p^2 \left\{ \begin{array}{l} y^2 + 2pr \\ - q \end{array} \right\} y - r^2 = 0.$$

Every equation has as many roots, as the

unknown quantity of the first term has

dimensions, or as the exponent thereof

contains units. See the articles ROOT

and EXPONENT.

All equations have as many affirmative

roots as there are permutations of signs;

and as many negative roots as there are

successions of them: thus, in the quad-

dratic  $x^2 + x - 6 = 0$ , there is only one

succession

succession of signs,  $++$ ; and one permutation of them,  $+-$ ; hence the equation has two roots, one affirmative  $+2$ , and the other negative  $-3$ . Also in the cubic equation  $x^3 - 3x^2 - 10x + 24 = 0$ , there are two permutations of signs,  $+-$  and  $++$ ; and only one succession  $---$ : hence its roots are found to be two affirmative  $+2$  and  $+4$ , and only one negative  $-3$ . For the methods of approximating to the roots of equations, by means of their limits and series, see the articles LIMIT and SERIES.

**Construction of EQUATIONS.** See the article CONSTRUCTION.

**Exponential EQUATION.** See the article EXPONENTIAL.

**Transcendental EQUATION.** See the article TRANSCENDENTAL.

**Annual EQUATION** of the mean motion of the sun, and moon's apogee and nodes. The annual equation of the sun's mean motion depends upon the eccentricity of the earth's orbit round him, and is  $16\frac{1}{2}$  such parts, of which the mean distance between the sun and the earth is 1000; whence some have called it the equation of the center, which, when greatest, is  $1^\circ 56' 20''$ .

The equation of the moon's mean motion is  $11' 40''$ ; of the apogee,  $20'$ ; and of its node,  $9' 30''$ .

These four annual equations are always mutually proportionable to each other; so that when any of them is at the greatest, the three others will also be greatest; and when one diminishes, the rest diminish in the same ratio. Wherefore the annual equation of the center of the sun being given, the other three corresponding equations will be given; so that one table of the central equations will serve for all.

**EQUATION of a curve**, an equation expressing the nature of a curve, the relation between an absciss and a corresponding ordinate, or the relation of their fluxions. See the article CURVE.

**EQUATION of time**, in astronomy and chronology, the reduction of the apparent time or motion of the sun, to equable, mean, or true time.

The difference between true and apparent time arises from two causes, the eccentricity of the earth's orbit, and the obliquity of the ecliptic: Thus,

If the earth revolved in the plane of the equator, and in a circle about the sun,

then would the angle  $ASB$  (pl. XCIII. fig. 3. n° 1.) and consequently the angle  $eBm$ , be always of the same quantity; and, therefore, the time of describing the said angle,  $eBm$ , would always be equal; and the solar days and hours be equal among themselves. But neither of these two cases have place in nature; for the earth's orbit being an ellipsis, her annual motion cannot be equable, or the angle  $ASB$  (*ibid.*) described in the same space of time, will not be always equal; since, in the aphelium, the velocity of the earth will be less than in the perihelium, and consequently the arch  $AB$ , and the similar arch  $em$ , will be less; and, therefore, likewise the time of describing it. But the most considerable part of the equation of time is that which arises from the plane of the earth's orbit, or ecliptic, being inclined to that of the equator, or plane of the diurnal motion. To explain this, let  $\varphi H \triangle$  (*ibid.* n° 2.) be a semi-circle of the ecliptic, and  $\varphi H \triangle$  of the equinoctial,  $S$  the center of the sun, and  $A$  that of the earth, in the third quarter of the ecliptic,  $\varphi \triangle$ ;  $bf$  the meridian passing through the true sun  $S$ , and its apparent place at  $I$ , in the first quarter of the ecliptic  $\varphi \triangle$ . Suppose now the motion of the earth in every respect equable, and first that it set out from  $\triangle$ , and proceeded in the equinoctial in a given time to  $D$ ; the sun would apparently describe, in the same time, the arch of the equinoctial  $\varphi I$ . Again, suppose it set out from the same point,  $\triangle$ , and spent the same time, with the same equable velocity, in the ecliptic, it would arrive to the point  $A$ ; so that the arch  $\triangle A = \triangle D$ , and  $\varphi I = \varphi C$ . Then it is evident, as the earth revolves about its axis from west to east, the meridian of any place will first arrive at the sun  $I$ , in the ecliptic, and afterwards at the sun  $C$ , in the equinoctial; that is, the time of noon by the sun in the ecliptic will be sooner than that by the sun in the equinoctial, by the quantity of the arch  $bD$ , turned into time.

Now the arch  $bD = BC$  is the difference of the sun's longitude  $\varphi I$  or  $\varphi C$ , and his right ascension  $\varphi B$ . Draw  $ge$  parallel to  $DC$ , and the angle  $eAf$  will be equal to the angle  $DSb$ , and the arch  $ef$  similar to the arch  $Db$ . Therefore, the time in which the meridian  $bf$  revolves into the situation  $eg$ , is that which

is to be added to the ecliptic noon, to equate it with the time of the equinoctial noon, in the first and third quarters of the ecliptic. In the second and fourth quarters the said equation is to be subtracted, as would easily appear, by making the same construction there.

Since, in different parts of the quadrant this arch  $Dh$ , or  $BC$ , is of different lengths, the equation of time will be a variable quantity; and, therefore, as the motion and time measured by the sun in the equinoctial is always equal, it follows that the times measured by the sun in the ecliptic must be always unequal; or, in other words, the solar days are sometimes shorter, sometimes longer, than the equal time measured out in the equinoctial.

As the true motion of the earth precedes its mean motion in the first semi-circle of anomaly, and is preceded by the mean in the second, it follows, that while the earth is going from the aphelium to the perihelium, or while the sun apparently moves from the apogæum to the perigæum, the apparent time will be before the mean; and, in the other semi-circle of anomaly, it will be after it. The difference of these motions, converted into time, is the equation of time in this respect, and is to be subtracted from the apparent time to gain the mean, or added to the mean to gain the apparent, in the first semi-circle of anomaly; and, *vice versa*, in the latter.

Both these parts of the equation of time are calculated by astronomers for every degree of the sun's longitude in the

ecliptic, and disposed in tables with directions for adding or subtracting, as the case requires; by which means the true equal time may, at all times, be had.

From what has been said it appears, that the apparent time, or that shewn by a sun-dial, is but four days in the whole year the same with the mean or equal time, shewn by a good clock or watch, *viz.* about April 15, June 17, Aug. 31, and Dec. 24. It is also remarkable, that about the third of November the equation is greatest of all, clocks being then about 16' 13" slower than sun-dials.

As, therefore, the solar days are unequal, the hours must be so of course; and, according as the above-mentioned causes, which are independent on each other, concur, or counteract each other, this inequality is more or less. Besides, as the former of these causes, *viz.* the eccentricity of the earth's orbit, is affected by the precession of the equinoxes, tables of the equation of time, made for any year, must continually afterwards deviate more and more from the truth; yet, as this variation is extremely slow, the same tables may very well serve for an age, or more, without any sensible error.

Here follows a table of the equation of time, calculated for the new or gregorian style, and shewing how much equal or true time is faster or slower than apparent time, for every day throughout the year; or, which comes to the same thing, how many minutes and seconds a good clock or watch is faster or slower than a good sun-dial.

Days.	Januar.		Febr.		March.		April.		May.		June.		July.		August.		Sept.		Octob.		Nov.		Dec.	
	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.	Faster	Min.
1	4	6	14	13	12	48	4	1	8	3	47	2	3	5	46	0	18	10	23	16	13	10	32	
2	4	34	14	20	12	36	3	43	3	16	2	38	3	19	5	42	36	10	42	16	13	10	9	
3	5	2	14	23	12	23	3	25	3	23	2	29	3	31	5	38	55	11	0	16	13	9	45	
4	5	30	14	32	12	9	3	6	3	30	2	19	3	42	5	33	1	14	18	16	12	9	20	
5	5	57	14	37	11	55	2	48	3	36	2	9	3	52	5	28	1	34	36	16	10	8	55	
6	6	24	14	41	11	41	2	30	3	42	1	59	4	2	5	22	1	54	53	16	8	29		
7	6	50	14	44	11	26	2	13	3	47	1	48	4	12	5	15	2	14	12	10	16	4	8	
8	7	41	14	47	11	11	1	55	3	51	1	37	4	22	5	8	2	34	27	16	0	7	37	
9	7	8	14	48	10	56	1	38	3	55	1	26	4	31	5	0	2	54	43	15	54	7	10	
10	8	6	14	49	10	40	1	21	3	58	1	14	4	40	4	52	3	14	58	15	48	6	42	
11	8	39	14	49	10	24	1	4	4	0	1	2	4	48	4	43	3	35	13	13	15	41	6	14
12	8	59	14	48	10	7	0	48	4	0	0	50	4	56	4	34	3	55	13	28	15	34	5	46
13	9	22	14	47	9	50	0	32	4	4	0	38	5	4	4	24	4	16	13	42	15	25	5	18
14	9	44	14	44	9	33	0	16	4	5	0	26	5	11	4	13	4	37	13	56	15	16	4	49
15	10	5	14	41	9	16	0	**	1	4	0	13	5	17	4	2	4	58	14	9	15	6	4	19
16	10	26	14	37	8	58	0	14	4	5	0	**	5	23	3	50	5	19	14	22	14	55	3	50
17	10	46	14	33	8	40	0	29	4	4	0	12	5	29	3	38	5	40	14	33	14	43	3	20
18	11	5	14	28	8	22	0	43	4	0	0	25	5	34	3	26	6	1	14	45	14	30	2	51
19	11	24	14	22	8	4	0	57	4	0	0	38	5	39	3	12	6	22	14	16	2	21	5	18
20	11	42	14	15	7	46	1	11	3	58	0	50	5	43	2	59	6	42	15	6	14	2	1	51
21	11	59	14	8	7	27	1	24	3	55	1	3	5	46	2	45	7	3	15	15	13	46	1	20
22	12	15	14	0	7	9	1	37	3	51	1	16	5	49	2	30	7	24	15	24	13	30	0	50
23	12	30	13	52	6	50	1	49	3	47	1	29	5	51	2	15	7	44	15	32	13	0	**	20
24	12	45	13	43	6	13	2	12	3	37	1	42	5	53	2	0	8	5	15	40	12	56	0	40
25	12	59	13	33	6	13	2	23	3	37	1	55	5	54	1	44	8	5	15	46	12	38	0	40
26	13	12	13	22	5	54	2	33	3	25	2	7	5	55	1	28	8	45	15	52	12	18	1	10
27	13	24	13	12	5	35	2	43	3	18	2	32	5	54	0	54	9	5	15	58	11	58	1	40
28	13	36	13	0	5	16	2	52	3	11	2	44	5	55	0	36	9	45	16	6	11	17	2	39
29	13	46			4	57	2	3	3	3	2	56	5	53	0	19	10	4	16	9	10	55	3	8
30	13	56			4	39	3	0	2	55	5	1	5	49	0	**	1	16	11	16	11	37		
31	14				4	20	4		2	55	5		5											

**EQUATOR**, in geography, a great circle of the terrestrial globe, equidistant from its poles, and dividing it into two equal hemispheres; one north, and the other south. See the article **GLOBE**.

It passes through the east and west points of the horizon, and at the meridian is raised as much above the horizon as is the complement of the latitude of the place. From this circle, the latitude of places, whether north or south, begin to be reckoned, in degrees of the meridian. See **LATITUDE** and **MERIDIAN**.

All people living on this circle, called by geographers and navigators, the line, have their days and nights constantly equal. See the article **EQUINOCTIAL**. It is in degrees of the equator, that the

longitude of places are reckoned; and as the natural day is measured by one revolution of the equator, it follows that one hour answers to  $\frac{360}{24} = 15$  degrees: hence one degree of the equator will contain four minutes of time; fifteen minutes of a degree will make a minute of an hour; and, consequently, four seconds answer to one minute of a degree.

**EQUERRY**, in the british customs, an officer of state, under the master of the horse.

There are five equerries, who ride abroad with his majesty; for which purpose they give their attendance monthly, one at a time, and are allowed a table.

As

As to the equerries of the crown-stable, they have this distinct appellation, as being employed in mounting, managing, and breaking the saddle-horses for his majesty's use, and holding his stirrup.

**EQUES AURATUS**, is used for a knight bachelor, called *auratus*, q. d. *gilt*, because antiently none but knights were allowed to beautify their armour, or other habiliments for war, with gold.

This term is not used in law, but instead of it *miles* & *chevalier* are made use of.

**EQUESTRIAN STATUE**, signifies the statue of a person mounted on horseback.

**EQUESTRIAN ORDER**, among the Romans, signified their knights, or equites; as also their troopers, or horsemen in the field; the first of which orders stood in contradistinction to the senators, as the last did to the foot, military, or infantry: each of these distinctions was introduced into the state by Romulus. See the articles **SENATOR** and **PEDITES**.

**EQUIANGULAR**, in geometry, an epithet given to figures, whose angles are all equal: such are a square, an equilateral triangle, &c.

**EQUICRURAL**, in geometry, the same with isosceles. See the article **ISOsceLES**.

**EQUICULUS**, or **EQUULEUS**. See the article **EQUULEUS**.

**EQUIDIFFERENT NUMBERS**, in arithmetic, are of two kinds. 1. Continually equidifferent is when, in a series of three numbers, there is the same difference between the first and second, as there is between the second and third; as 3, 6, 9. And, 2. Discretely equidifferent, is when in a series of four numbers or quantities, there is the same difference between the first and second, as there is between the third and fourth: such are 3, 6, 7, 10.

**EQUIDISTANT**, an appellation given to things placed at equal distance from some fixed point, or place, to which they are referred.

**EQUILATERAL**, in general, something that hath equal sides, as an equilateral angle.

**EQUILATERAL HYPERBOLA**, one whose transverse diameter is equal to its parameter; and so all the other diameters, equal to their parameters: in such an hyperbola, the asymptotes always cut one another at right angles in the center. Its most simple equation, with regard to the transverse axis, is  $y^2 = x^2 - a^2$ ; and, with regard to the conjugate,  $y^2 = x^2 + a^2$ , when  $a$  is the semitrans-

verse, or semiconjugate. The length of the curve cannot be found by means of the quadrature of any space, of which a conic section is any part of the perimeter. See the article **HYPERBOLA**.

**EQUILIBRIUM**, in mechanics, is when the two ends of a lever or balance hang so exactly even and level, that neither doth ascend or descend, but keep in a position parallel to the horizon; which is occasioned by their being both charged with an equal weight.

**EQUIMULTIPLES**, in arithmetic and geometry, are numbers or quantities multiplied by one and the same number or quantity. Hence, equimultiples are always in the same ratio to each other, as the simple quantities before multiplication: thus, if 6 and 8 are multiplied by 4, the equimultiples 24 and 32 will be to each other, as 6 to 8.

**EQUINOCTIAL**, in astronomy, a great circle of the celestial globe, whose poles are the poles of the world.

It is so called, because whenever the sun comes to this circle, the days and nights are equal all over the globe; being the same with that which the sun seems to describe, at the time of the two equinoxes of spring and autumn. See the article **EQUINOX**.

All stars, directly under this circle, have no declination, and always rise due east, and set full west. The hour circles are drawn at right angles to it, passing thro' every fifteenth degree; and the parallels to it are called parallels of declination. See the articles **DECLINATION** and **CIRCLE**.

EQUINOCTIAL	{	COLURE,	} See	COLURE.
		DIAL,		DIAL.
		HOUR,		HOUR.
		LINE,		LINE.
		OCCIDENT,		OCCIDENT.
		ORIENT,		ORIENT.
		POINT, &c.		POINT, &c.

**EQUINOX**, the time when the sun enters either of the equinoctial points, where the ecliptic intersects the equinoctial. See the preceding article.

It is so called, because when the sun is in these points, the days and nights are of an equal length all the world over. As the sun is in one of them, in the spring, *viz.* March 20th, it is called the vernal equinox; and in the other, in autumn, *viz.* September 23d, it is called the autumnal equinox.

*Precession of the EQUINOXES*. See the article **PRECESSION**.

**EQUINUS BARBATUS**, in astronomy, a kind of comet, called also hippcus. See the article HIPPEUS.

**EQUINUS VENTER**, among chemists. See the article VENTER EQUI.

**EQUIPOLLENCE**, in logic, is when there is an equivalence, or agreement, either as to the nature of the thing, or as to the grammatical sense of any two, or more propositions; that is, when two propositions signify one and the same thing, though they express it after different manners.

**EQUISELE**, or **EQUISELIS**, in ichthyology, the same with the guaracapema.

**EQUISELIS** is also the name of a two-winged fly, resembling the hornet both in size and shape.

**EQUISETUM**, **HORSETAIL**, in botany, a genus of the *cryptogamia* class of plants, and order of filices, or ferns; the fructifications of which are disposed on an oblong spike, and are of an orbicular figure, dividing in various angles from the base. The plant itself consists of jointed stalks, in some simple, in others branched; producing setæ, or smaller divisions, of the same structure with the larger ones.

Horse-tail is accounted vulnerable, and astringent, and therefore prescribed in hæmorrhages, and injuries of the kidneys and bladder.

**EQUITATA COHORTS**. See COHORT.

**EQUITY**, in a general sense, the virtue of treating all other men according to common reason and justice, or as we would be gladly treated ourselves, when we understand aright what is our due. See the article JUSTICE.

Equity is said to be of two kinds, the one of which abridges, and takes from the letter of the law, whilst the other enlarges, and adds thereto. The first is a correction of the law, generally made in that part wherein it fails, or is too severe, as where it is enacted that whosoever commits such a thing shall be deemed a felon, and suffer death: here, if a madman, or an infant, that has no discretion, commit the same, they shall not be deemed felons, nor suffer death for it; and where a person, to save his life, kills another that assaults him, tho' in general all killing is felony, this, by the law of reason, will be excused.

The other equity is defined to be an extension of the words of the law to cases unexpressed, yet having the same reason: as for example, the statute which

ordains, that in an action of debt against executors, he that appears by distress shall answer; this, by equity, extends to administrators, for such of them as appears first shall, by the equity of the said act, answer, because they are of the like kind and degree.

**EQUITY of redemption**, in our law, is applied to mortgages, as where money being due on a mortgage, the mortgagee is desirous to bar the mortgagor's equity of redemption, that is, his right to redeem the mortgage. In this case the mortgagee may oblige the mortgagor, either to pay the money, or to be foreclosed of his equity of redemption. The practice is to exhibit a bill, to which answer being put in, and a decree obtained, a master of that court certifies what is due for principal, interest, and costs, which is to be paid within the time limited by the decree, and thereupon the estate mortgaged is to be reconveyed to the mortgagor, otherwise for default of payment, the mortgagor is decreed to be foreclosed from all equity of redemption, and absolutely to convey the mortgaged premises to the mortgagee. See the article MORTGAGE.

**EQUITY** also frequently signifies the court of chancery, where controversies are determined according to the exact rules of equity and conscience, by mitigating the rigor of the common law; though even by the common and statute law there is also an equity. See the article CHANCERY.

*Equitas sequitur legem*, is an old maxim in law, but from the great increase of suits in chancery, some have thought fit to give it this construction, that in all causes, after a man hath been at law, he must go to equity.

**EQUIVALENT**, an appellation given to things which agree in nature, or other circumstances, as force, virtue, &c.

**EQUIVOCAL TERMS**, or **WORDS**, among logicians, are those which have a doubtful, or double meaning.

According to Mr. Locke, the doubtfulness and uncertainty of words has its cause more in the ideas themselves, than in any incapacity of the words to signify them; and might be avoided, would people always use the same term to denote the same idea, or collection of ideas: but, adds he, it is hard to find a discourse on any subject where this is the case; a practice which can only be imputed to folly, or great dishonesty; since a man,

in making up his accounts, might with as much fairness use the numeral characters sometimes for one, sometimes for another collection of unities.

**EQUIVOCAL ACTION** is, where the effect is of a different kind from the cause producing it.

**EQUIVOCAL CAUSE.** See **CAUSE**.

**EQUIVOCAL GENERATION**, the production of animals, without the intercourse between the sexes, by the influence of the sun or stars, &c.

The equivocal generation of plants, is their production without seed, in the ordinary course of nature. See the article **GENERATION**.

This kind of generation is now quite exploded by the learned. Mr. Ray is clearly of opinion, that there is no such thing as spontaneous or equivocal generation; but that all animals are the issue of parents of the same species with themselves; and with him agree Redi, Willughby, and Lister. This last author hath fully refuted the vulgar notion, that horse-hairs, thrown into water, will become animated bodies; by shewing, that appearances of this kind are hair-worms bred in the bodies of other insects, and particularly of the common black beetle.

**EQUIVOCATION**, in ethics, the crime of wilfully using equivocal terms. See the article **EQUIVOCAL**.

**ÆQUULEUS**, or **ECUULEUS**, in antiquity, a kind of rack used for extorting a confession, at first chiefly practised on slaves, but afterwards made use of against the christians.

The equuleus was made of wood, having holes at certain distances, with a screw, by which the criminal was stretched to the third, sometimes to the fourth, or fifth holes; his arms and legs being fastened on the equuleus with cords; and thus was hoisted aloft, and extended in such a manner, that all his bones were dislocated. In this state red hot plates were applied to his body, and he was goaded in the sides with an instrument called ungula.

**ÆQUULEUS**, in astronomy, a constellation of the northern hemisphere, whose stars, according to Ptolemy, and Tycho's catalogues, are four, but in Mr. Flamsteed's ten.

**EQUUS**, the **HORSE**, in zoology. See the article **HORSE**.

**ÆQUUS MARINUS**, in ichthyology, the same with the morse. See **MORSE**.

**ERA**, or **ÆRA**. See the article **ÆRA**.

**ERANARCHA**, a public officer among the ancient Greeks, whose business was to preside over, and direct, the alms and provisions made for the poor. Cornelius Nepos, in his life of Epaminondas, describes his office thus; when any person was reduced to poverty, taken captive, or had a daughter to marry, which he could not effect for want of money, &c. the eranarcha called an assembly of friends and neighbours, and taxed each according to his means and estate, to contribute towards his relief.

**ERANTHEMUM**, in botany, a genus of the *diandria-monogynia* class of plants, the corolla of which is quinquefid, the tube filiform, and the stigma single.

**ERANTHEMUM** is also a name given to the adonis flos. See the article **ADONIS**.

**ERASED**, in heraldry, the same with arrache. See the article **ARRACHE**.

It also denotes parts of animals torn, not cut off, from the part to which nature fixed them.

**ERECT FLOWERS**, such as grow upright without hanging or reclining the head. See the article **FLOWER**.

**ERECT DIAL**. See the article **DIAL**.

**ERECT-VISION**. See the article **VISION**.

**ERECTION**, in a general sense, the art of raising or elevating any thing, as the erection of a perpendicular, &c.

**ERECTION** is also used in a figurative sense, as the erection of a bishopric, marquisate, &c.

**ERECTION** is particularly used by medical writers, for the state of the penis, when swelled and distended by the action of the muscles called erectores. See the article **ERECTOR**.

There is also an erection of the clitoris, which is performed by muscles for that purpose. See the article **CLITORIS**.

De Graaf assigns two kinds of vessels with its muscles, for the performance of this office; the nerves, by which the animal spirits flow into its membranous parts, and render them more rigid and tumid, and the arteries carrying the blood to distend the corpora cavernosa.

**ERECTOR CLITORIS**, in anatomy, one of the two muscles of the clitoris that serve for its erection.

The erectores of the clitoris arise from the ossa ischia, and are inserted into the corpora cavernosa.

**ERECTOR PENIS**, one of the two muscles of the penis, that serve for its erection.

Their

These arise on each side from the ossa ischia between the tubercle of this bone and the beginning of the corpus cavernosum, and each of them is inserted into the corpus cavernosum of its own side. These muscles when they act together, press the veins of the back of the penis against the ossa pubis, by which they prevent the reflux of blood from the penis; and consequently when at the same time the blood flows impetuously into the part by the arteries, and cannot get back this way, the penis becomes erected.

EREMIT, or HERMIT. See HERMIT.

EREMITA, the HERMIT, in zoology, a species of squill, with a long soft tail, and the right claw the larger. See the article SQUILL.

Authors call it cancellus, or the little crab, as being only two inches and a half in length.

ERESIA, in botany, the same with theophrasta. See the article THEOPHRASTA.

ERETRIAN EARTH, in natural history, a kind of bole. See the article BOLE.

ERFURT, a large and beautiful city of upper Saxony, in Germany, capital of Thuringia, and subject to the elector of Mentz: east lon.  $11^{\circ} 6'$ , north lat.  $51^{\circ}$ .

ERGOT, in farriery, is a stub, like a piece of soft horn, about the bigness of a chestnut, placed behind and below the pastern-joint, and commonly hid under the tuft of the fet-lock.

To disergot, or to take it out, is done by cleaving it to the quick, with an incision-knife, in order to pull up a bladder full of water, that lies covered with the ergot. This operation is scarce ever performed in France, but in Holland 'tis frequently performed upon all four legs, with intent to prevent watery sores, and other foul ulcers.

ERICA, HEATH, in botany. See the article HEATH.

ERICA MARINA, SEA-HEATH, in botany, a plant of the fucus-kind. See the article FUCUS.

ERICHTHONIUS, in astronomy, a constellation more usually called auriga.

ERIDANUS, in astronomy, a constellation of the southern hemisphere; containing, according to different authors, 19, 30, or even 68 stars.

ERIE, a vast lake to the westward of Pennsylvania, in north America, situated between  $80^{\circ}$  and  $87^{\circ}$  west lon. and between  $41^{\circ}$  and  $42^{\circ}$  north lat.

ERIGERON, SWEET FLEABANE, in botany, a genus of the *syngenesia polygamia superflua* class of plants, the compound flower whereof is radiated; the partial hermaphrodite one infundibuliform; and the female flower is ligulated, linear, and subulated: The fruit has no pericarpium, the cup is connivent: the seeds of the hermaphrodite flower are oblong, small, and crowned with long down. This plant is a diuretic, and promotes the menses: the smell of it drives away flies, and kills lice and other like vermin.

ERINACEUS, in botany, the same with hydnum. See the article HYDNUM.

ERINACEUS, in zoology, the name by which authors call the hedge-hog.

ERINGO, in botany, the english name of the eryngium. See ERYNGIUM.

ERIOCAULON, in botany, a genus of the *triandria tryginia* class of plants, the general corolla of which is uniform and convex; the partial flower consists of three lanceolated, obtuse, hairy petals, narrow at the base, where they all three unite into one styiform hairy pedicle: the cup changes into a capsule, and contains a single seed winged with down.

ERIOCEPHALUS, in botany, a genus of the *syngenesia polygamia necessaria* class of plants, the compound flower of which is radiated; the proper hermaphrodite one is funnel-shaped; the female ones, being five in number, are ligulated in the radius: there is no pericarpium: the seed of the hermaphrodite produces no fruit; the seed of the female is single, roundish, naked, and placed vertically.

ERIOCEPHALUS is also used by Vaillant for a species of thistle.

ERIOPHORUM, in botany, a genus of the *triandria monogynia* class of plants, without any flower petals: the cup is a spike imbricated with oval, oblong squamæ; the seed is a triquetrous and acuminate seed, furnished with hairs longer than the spike.

ERIOPHORUS, in botany, the same with the andryala. See ANDRYALA.

ERIOX, in ichthyology, a name used by some for the salmon. See SALMON.

ERITHACE, the name given by the antients to rough, or crude wax, as collected by the bees. See WAX.

ERITHACUS, in ornithology, a species of motacilla, called also rubecula. See the articles MOTACILLA and RUBECULA.

ERIVAN,



**ERIVAN**, a city of Persia, on the frontiers of Turkey, situated on the south end of a lake of the same name : east long.  $45^{\circ}$ , north lat.  $40^{\circ} 6'$ .

**ERKELENS**, a city of Westphalia, in Germany, ten miles north of Juliers : east long.  $6^{\circ}$ , north lat.  $51^{\circ}$ .

**ERMIN**, *ermineum*, in zoology, a species of mustela, with narrow ears, and of the size of the weasel. See **MUSTELA**. The whole body of the ermin is of a pure snow-white, except the tip of the tail, which is of a deep black, and some spots of a greyish yellow about the head and shoulders. Its fur is much valued. See the article **FUR**.

**ERMIN**, in heraldry, is always argent and sable, that is, a white field, or fur, with black spots. These spots are not of any determinate number, but may be more or less; at the pleasure of the painter, as the skins are thought not to be naturally so spotted; but serving for lining the garments of great persons, the furriers were wont, in order to add to their beauty, to sow bits of the black tails of the creatures that produced them, upon the white of their skin, to render them the more conspicuous, which alteration was introduced into armory. See plate **LXXXVIII.** fig. 4.

**ERMIN**, or **EARS OF CORN**, an order of knights in France, instituted by Francis the last of that name, duke of Britany. This order was so called on account that the collar of it was made up of ears of corn, lying athwart one another in saltier, bound together, both above and below, each ear being crossed twice, the whole of gold. To this collar there hung a little white beast, called an ermin, running over a bank of grass, diversified with flowers.

**ERMINE'**, or cross erminé, is one composed of four ermin spots, placed as represented in plate **LXXXVIII.** fig. 5. It is to be observed, that the colours in these arms, are not to be expressed, because neither this cross nor these arms can be of any other colour but white and black.

**ERMINES** are, by some english writers, held to be the reverse of erminé, that is, white spots on a black field, and yet the French use no such word, but call this black powdered with white *contre ermin*, which is very proper, as it denotes the reverse of ermin. See the article **ERMIN**.

**ERMINITES** should signify little ermines, but it is otherwise; for it expresses a

white field powdered with black, only that every such spot hath a little red hair on each.

**Erminites** also signify a yellow field powdered with black, which the French express much better by *or semé d'ermine de sable*.

**EROSION**, among physicians, denotes much the same with corrosion, only in a stronger degree. See the articles **CORROSION** and **CORROSIVES**.

**EROTIC**, in general, any thing relating to the passion love.

Physicians take notice of the erotic delirium, or that melancholy occasioned by excessive love. See the articles **MELANCHOLY** and **LOVE**.

**ERPACH**, a city of Franconia, in Germany, capital of a county of the same name, and situated thirty miles south east of Francfort : east long.  $8^{\circ} 50'$ , north lat.  $49^{\circ} 42'$ .

**ERQUIKO**, a port-town of the Red-sea, on the coast of Abex in Africa : east long.  $39^{\circ}$ , north lat.  $17^{\circ}$ .

**ERRANT**, or **ITINERANT**, is a title that is applied to justices that go the circuits, and also to bailiffs at large. See the article **EYRE**.

**ERRATA**, a list of the errors or faults in the impression of a book, generally placed at the beginning thereof.

**ERRATIC**, in general, something that wanders, or is not regular; hence it is, the planets are called erratic stars; as those fevers, which observe no regular periods, are denominated erratic fevers.

**ERRHINES**, *ἐρρῖνα*, in pharmacy, medicines which, when snuffed up the nose, promote a discharge of mucus from that part.

The excretion of the mucous lymph is excellently promoted by errhines and sternutatories, the former of which stimulate the pituitary coats but gently, whereas the latter more forcibly stimulate them, to an excretory motion. See the article **STERNUTATORY**.

Among the milder kind of the errhines, we may reckon marjoram, basilicon, thyme, hyssop, savory, marum syriacum, the tops of origanum, flowers of lillies of the valley, and benjamin, the resin of guaiacum, fine raspings of aloes wood, dry volatile salt of sal-ammoniac perfumed with oil of marjoram, as also white vitriol. On the contrary, violent errhines are euphorbium, the powder of white hellebore, and, in a milder degree, several

several sorts of snuffs, precipitate mercury, and pepper.

Errhines are more friendly to the constitution and nerves than sternutatories, by their subtil, acrid, and volatile salt, gently stimulating the pituitary membrane, and drawing the mucid humour from it. They are also much safer than sternutatories, in their effects.

Errhines prepared of cephalic herbs are of singular service in oppressive pains of the head, a hemicrania, lethargic disorders, weaknesses of memory, stuffings of the head, and coryza, mucous defluxions of the eyes, drowsiness, vertigoes, and in cases where the malignant humours, generated by the lues venerea, are lodged in the membranes of the nostrils.

**ERROUR, ERROR**, in philosophy, a mistake of our judgment, giving assent to that which is not true.

Mr. Locke reduces the causes of error to these four, first, want of proofs; secondly, want of ability to use them; thirdly, want of will to use them; and, fourthly, wrong measures of probability.

That great writer observes upon the first of these causes of error, that the greatest part of mankind want conveniencies and opportunities of making experiments and observations themselves, or of collecting the testimonies of others, being prevented by the necessity of their condition. Upon the second of these causes he observes, that there are many who from the state of their condition, might bestow time in collecting proofs, but yet are not able to carry a train of consequences in their heads, nor weigh exactly the preponderancy of contrary proofs and testimonies, merely from the difference in mens understandings, apprehensions, and reasonings. Thirdly, he remarks, that though some have opportunities and leisure enough, and want neither parts, learning, nor other helps, that they never come to the knowledge of several truths within their reach, either upon the account of their attachment to pleasure or business; and otherwise because of their laziness, or aversion to study. The fourth cause of error, *viz.* wrong measures of probability, he imputes, 1. To the practice of taking for principles propositions that are not in themselves certain and evident, but, on the contrary, doubtful and false. 2. To received hypotheses. 3. Predominant passions or inclinations. And, 4. To authority, or the giving up our as-

sent to the common received opinions either of our friends or party, neighbours or country.

The causes of errors in philosophy, or the reasons why all former philosophers have through so many ages erred, according to lord Bacon, are these following.

1. Want of times suited to learning.
2. The little labour bestowed upon natural philosophy.
3. Few entirely addicted to natural philosophy.
4. The end of the sciences wrong fixed.
5. A wrong way chosen.
6. The neglect of experiments.
7. Regard to antiquity and authority.
8. Admiration of the works in use.
9. The artifice of teachers and writers in the sciences.
10. Ostentatious promises of the moderns.
11. Want of proposing worthy tasks.
12. Superstition and zeal being opposite to natural philosophy, as thinking philosophy dangerous, on account of the school-theology; from the opinion that deep natural enquiries should subvert religion.
13. Schools and academies proving unfavourable to philosophy.
14. Want of rewards.
- And, 15. Despair and the supposition of impossibility.

**ERUCA**, the **CATERPILLAR**, in zoology.

See the article **CATERPILLAR**.

**ERUCA**, the **WHITE-ROCKET**, in botany, a species of brassica, with lyrate leaves, hairy stalks, and smooth pods. See the article **BRASSICA**.

**ERUCA MARINA**, a sea-insect, more usually called aphrodita. See **APHRODITA**.

**ERUCAGO**, **CORN-ROCKET**, in botany, a genus of plants called also bunias. See the article **BUNIAS**.

**ERUCTATIONS**, in medicine, are the effect of flatulent foods, and the crudities thence arising. See **FLATULENCY**.

**ERUDITION**, *eruditio*, denotes an extensive acquaintance with books, especially such as treat of the belles lettres.

**ERVI SPECIES**, in botany, the name by which Dillenius calls sophora. See the article **SOPHORA**.

**ERUPTION**, in medicine, a sudden and copious excretion of humours, as pus or blood: it signifies also the same with exanthema, any breaking out, as the pustules of the plague, small-pox, measles, &c. See the article **EXANTHEMA**, &c.

The pestilent eruptions are spots of a purple or red colour; or they are black, or of a violet colour: commonly they are of a round figure, sometimes broad, or of an oblong or some other shape: they shew themselves in the skin up and down

the

the body. See the articles **PLAGUE**, **BUBOE**, **CARBUNCLE**, &c.

Spots of a purple, black, greenish, or violet colour, at whatever time they appear, are always fatal signs.

**Scabby ERUPTIONS** in the heads of children. See the articles **CRUSTA LACTEA**, and **ACHOR**.

The heads of children are often troubled with scabby eruptions : these are expelled by the benefit of nature ; and before the eruption, the child is often troubled with epileptic fits from the irritation of the morbid matter. If the humour strike in, either spontaneously, or by improper applications ; or if the exanthemata are of a blackish colour, they are very dangerous, and the child generally falls into an asthma, or a fatal epilepsy.

Harris prescribes the testaceous powders for infants in this case. Heister, if the child is suspected of the venereal disease, would have a grain or two of mercurius dulcis added with gentle purges between whites, especially if the body is not loose. Externally, nothing of sulphur, or mercury should be applied, or repellent lotions, or any cold thing. To mollify the scabs, fresh butter, or calves marrow, or cream, is sufficient. This case often proves obstinate, and then the nurse should observe a strict regimen, use a good diet, take sweeteners of the blood, and purgatives now and then.

**ERVUM**, a genus of the *diadelphia-decandria* class of plants, the corolla of which is papilionaceous ; the vexillum plane, slightly turned up, and of a roundish form ; the alæ are obtuse, and shorter by half than the vexillum ; the carina is acuminate, and shorter than the alæ : the fruit is a thick, knotty, obtuse and oblong pod, with protuberant seeds, which are four in number, and of a roundish figure. This plant, abounding with diuretic salt, is recommended for the stone.

**ERYNGIUM**, **ERINGO**, in botany, a genus of the *pentandria-digynia* class of plants, the general corolla of which is uniform and roundish ; the partial one consists of five oblong petals, knotted together by a longitudinal line. The fruit is of an oval figure, and divisible in two parts : the seeds are oblong and roundish. The root of eryngium is attenuant and deobstruent, and is therefore esteemed a good hepatic, uterine, and nephritic. Its whole virtue consists in the external or cortical part.

**ERYNGIUM** is also used by some for aloes and a species of ammi. See the articles **ALOES** and **AMMI**.

**ERYSIMUM**, **HEDGE-MUSTARD**, in botany, a genus of the *tetradynamia-siliquosa* class of plants, the corolla whereof consists of four oblong, cruciform petals, with a very obtuse point : the fruit is a long, linear, four-cornered pod, consisting of two valves, and divided into two cells : the seeds are numerous, small, and roundish.

This plant is recommended in paralytic and epileptic cases ; it expels poison, destroys worms, strengthens the stomach, and cures ulcers of the mouth.

**ERYSIPELAS**, in medicine, an eruption of a fiery or acrid humour, from which no part of the body is exempted, though it chiefly attacks the face.

As to the material cause of an erysipelas, it seems to be of a caustic, acrid, and putrefying nature ; perhaps corrupted bile, which, being conveyed into the mass of blood, indisposes the whole nervous and vascular systems, and excites a fever, till it is at last driven out to the surface of the body. Persons of a sanguine habit, young people, and pregnant women, are most subject to it ; and all hot things, violent passions, and whatever occasions other inflammations, likewise give rise to this. See the article **INFLAMMATION**.

The patient is taken suddenly, whilst he is in the open air, with chiliness, a shivering, and other symptoms common in a fever : the part affected swells a little with great pain, and intense redness, and is beset with a vast number of small pustles, which, when the inflammation is increased, are converted into small blisters. The malady gradually creeps further and further, spreads itself from place to place, and is attended with a fever. See the article **FEVER**.

There is another sort, though it seldom happens, commonly arising from a surfeit, or a debauch of drinking spirituous liquors. A small fever which precedes it, is followed presently by an eruption of pustles, almost all over the body, which look like the stings of nettles, and sometimes rise up into bladders : presently they go away again, with an itching scarce tolerable ; but as often as they are scratched, they appear again.

This distemper has a great affinity with a pestilential fever, as it is attended with most of the symptoms in that case : but

this is to be understood of the worst kind of erysipelas. On the third and fourth day, the malignant matter is thrown out on the surface of the body, and then the symptoms a little abate. There is often a pain, redness, and tumour in the inguinal glands, from whence the matter, of a hot, fiery quality, descends to the feet. If the head is attacked, the parotid glands are affected; if the breast, the axillary. The mammary and axillary glands are not seldom ulcerated, and affect the joints with a virulent corruption; and likewise, as in the plague, there is nothing more dangerous than the expelled matter to return back from the surface of the body to the inward parts.

In some, especially young persons, the matter is not so violent, nor the fever so great: the glands remain unaffected, and the eruption happens on the second day. This is not at all dangerous. In children, the umbilical region generally suffers, with a fatal event. In a day or two the tumor subsides, the heat and pain cease, the rosy colour turns yellow, the cuticle breaks, and falls off in scales, the danger is over. When the erysipelas is large, deep, and falls upon a part of exquisite sense, the patient is not very safe; but if the red colour changes into black and blue, it will end in a mortification. If the inflammation cannot be dissipated, it will suppurate, and bring on fistulas and a gangrene: when the patient is cachectical, the leg will sometimes swell three times as big as the natural size, and is cured with great difficulty. Those who die of this disease, die of the fever, which is generally attended with difficulty of breathing, sometimes a delirium, sometimes with sleepiness; and this in seven days time.

Let the patient's diet be water-gruel or barley-broth, with roasted apples. If he drinks any beer, let it be very small, and let him keep out of bed some hours in a day. The medicinal writers do not agree in their opinions, concerning purging in the cure of the erysipelas; but what they deliver upon this subject, is full of doubts and uncertainties, and that at a point of time when the distemper is most dangerous and threatening: however, it is the general opinion in this case, that it is a right practice, more especially if the head is affected with an erysipelas, and there comes upon it a coma, a delirium, or convulsions, wherein the brain is evident-

ly attacked; then purging is the only indication that can afford any hopes of recovering the patient: nor in these difficulties should the matter be delayed till the fever is abated, or the humor subsided. Therefore, the best practice appears to be that of taking away nine or ten ounces of blood, and the next morning giving the patient the common purging portion.

It will be safest to avoid external applications, unless a powder made of elder-flowers and liquorice sprinkled on the part; or lime-water mixt with a fourth part of spirit of wine and camphor, dipping a linnen cloth in it several times doubled, and applying it hot to the part. An infusion of scordium, elder-flowers, and fennel-seed, drank in the manner of tea, is useful to expel the morbid matter. If the disease does not yield to the first bleeding, let it be repeated. If that will not do, let it be reiterated twice more, one day being interposed between. On the days free from bleeding, prescribe a clyster of milk, and syrup of violets; also the cooling emulsion and julep.

Turner commends much a mixture of ol. sambucin. and aqua calcis, with some spirit of wine camphorated. A cataplasm of cow's dung is very good to ease the pain.

In a symptomatic erysipelas, the following liniment is good: R. Ol. sambucin. lixiv. tenuior. ana p. æ. m. let them be shaken well in a phial till they unite in an ointment.

In a scorbutic erysipelas, besides externals, sudorifics are to be given; as Rob. sambucin. spi. sambuci bezoar. min. sp. sal. armon. cochlear, &c.

**ERYTHOXYLUM**, a name given by some to brasil-wood. See **BRASIL**.

**ERYTHRINA**, **CORAL-TREE**, in botany, a genus of the *diadelphia-decandria* class of plants, the corolla of which is papilionaceous, and consists of four petals: the fruit is a very long pod, protuberated by the seeds, terminating in a small point, and consisting of one cell: the seeds are kidney-shaped.

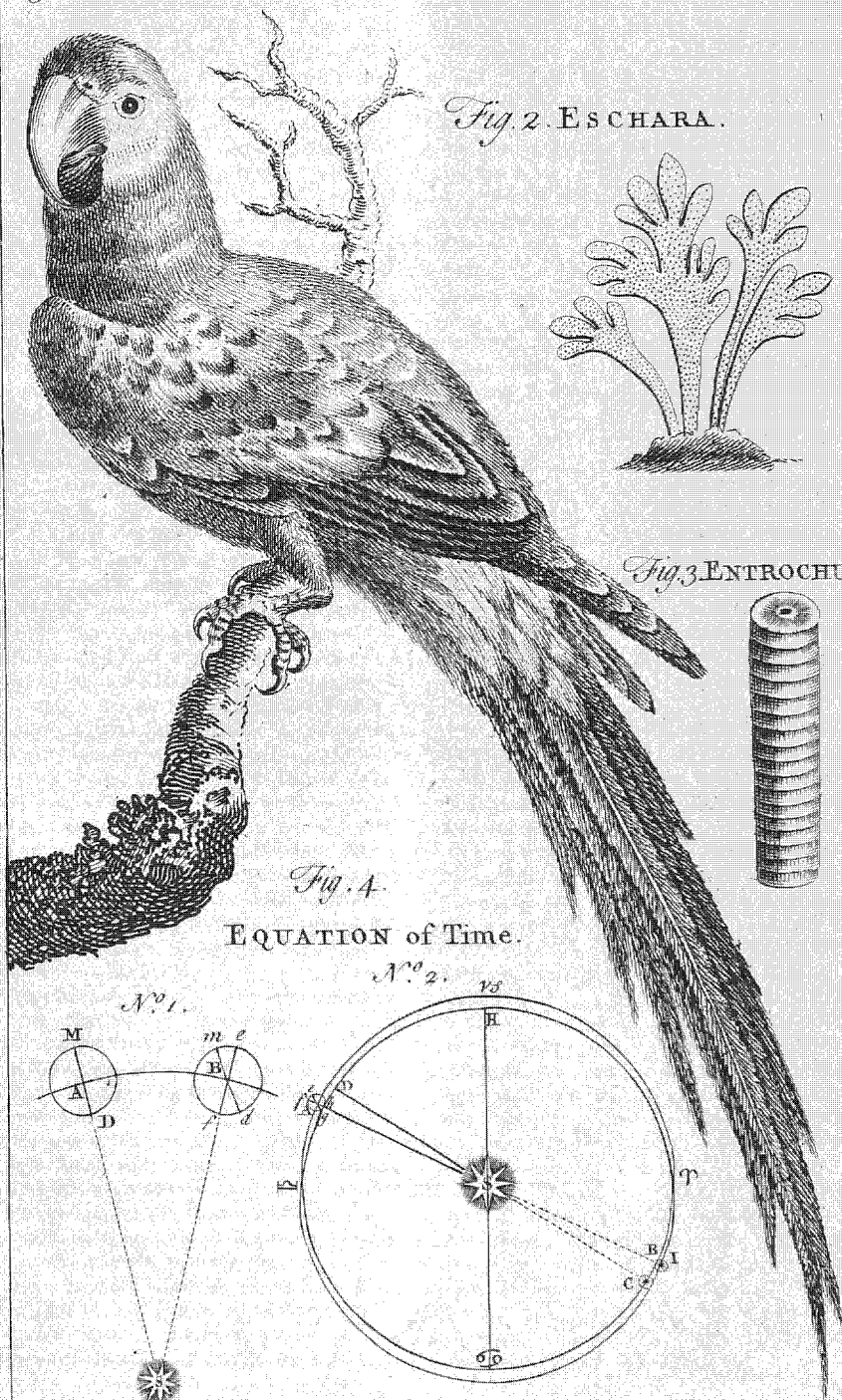
**ERYTHRINUS**, in ichthyology, a species of sparus, of a strong and elegant red colour, and the iris of the eyes of a fine silver-white: its tail is very much forked. See the article **SPARUS**.

**ERYTHROCYANEUS**, the red and blue maccaw, with a wedge-like tail, and the sides of the head naked and rugose.

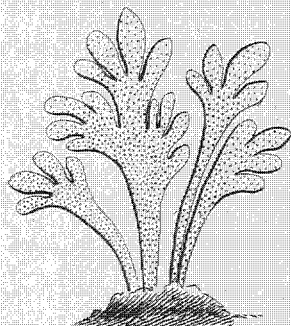
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*Fig. 1. ERYTHROCYANEUS, or the RED and BLUE MACKAW.*



*Fig. 2. ESCHARA.*

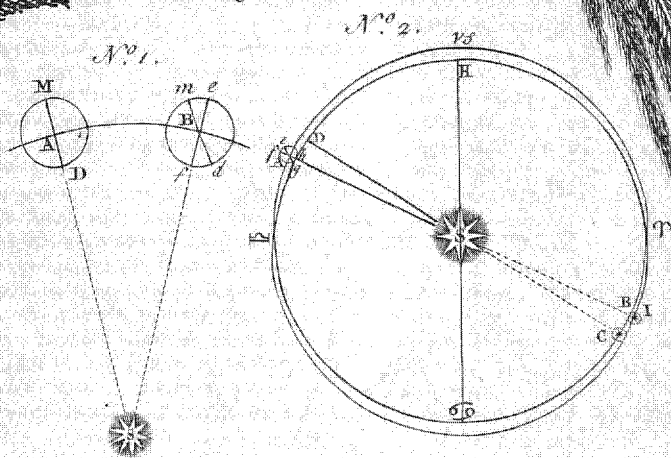


*Fig. 3. ENTROCHUS.*



Fig. 4.

### EQUATION of Time.



This bird is undoubtedly, says Mr. Edwards, the first of the parrot-kind; being a full yard long, from the point of the bill to the end of the tail, and its plumage adorned with the most beautiful variety of colours. Its head, neck, breast, belly, thighs, upper part of the back, and lesser covert feathers of the wings, are of a very fine bright red, or scarlet-colour. The quill-feathers of the wings are of a very fine blue on their outides, and a faint red on their under sides; the next feathers above them are of a fine yellow colour, some of them being tipped with green, as are the blue quills next the back: the lower belly and under side of the tail, are of a beautiful blue, as are the short ones on its upper side; and its long feathers are red tipped with blue. See plate XCIII. fig. 1.

**ERYTHRODANUM**, a name sometimes used for madder. See **MADDER**.

**ERYTHROIDES**, in anatomy, the first of the proper tunics or coats which cover the testicles. See **TESTICLE**.

**ERYTHRONIUM**, **DOG'S TOOTH-VIOLET**, in botany, a genus of plants belonging to the *hexandria-monogynia* class; the flower consists of six oblong and lanceolated petals; and the fruit is a subglobose capsule, with three cells, in which are contained numerous ovato-acuminated seeds.

The root of this plant is recommended against the colic, epilepsy, and worms: it is also reckoned a provocative to venery.

**ERYTHROPTHALMUS**, the **SARPE**, or **RED-EYE**, in ichthyology, a species of cyprinus, with the iris of the eye, all the fins, and tail red. See **CYPRINUS**.

It somewhat resembles the roach, and is only ten inches in length.

**ERZERUM**, the capital of the province of Turcomania, or Armenia: east long. 41°, north lat. 40°.

It is a great thoroughfare from Persia and India to Constantinople, by the way of Trebisond and the Black-sea.

**ESCALADE**, or **SCALADE**, in the art of war. See the article **SCALADE**.

**ESCAMBIO**, or **EXCAMBIO**, the same with exchange. See **EXCHANGE**.

**ESCAPE**, in law, a violent or privy evasion out of some lawful restraint, without being delivered by due course of law. There are two sorts of escapes, voluntary and negligent. Voluntary, when a man arrests another for felony, or other crime, and afterwards lets him go freely by consent; in which case, the party that per-

mits such escape, is held guilty, committed, and must answer for it. Negligent escape, on the contrary, is where one is arrested, and afterwards escapes against the will of the person that arrested him, and is not pursued with fresh suit, and re-taken before the person pursuing hath lost sight of him. By stat. 8 & 9 Will. III. c. 26. the keepers of prisons, conniving at escapes, shall forfeit 500 l. and, in civil cases, the sheriff is answerable for the debt.

**ESCAPE-WARRANT**, a process which issues out against a person, committed in the king's bench or fleet prisons, that, without being duly discharged, takes upon him to go at large.

Upon this warrant, which is obtained on oath, a person may be apprehended on a Sunday.

**ESCHALOT**, *cepa ascalonica*, a species of onion cultivated in gardens, for its use in cookery. See the article **CEPA**.

**ESCHAR**, in surgery, the crust or scab occasioned by burns or caustic medicines. See the articles **BURN** and **CAUSTICS**.

**ESCHARA**, in botany, a genus of sea-plants, composed of a gritty matter, but not very hard, of a reticulate texture, and sometimes disposed in the form of leaves, perforated with numerous roundish holes: these are so equally distributed, as to give the whole the appearance of a net. See plate XCIII. fig. 2.

There are several species of eschara, distinguished from the fucus, no less by their brittleness, than by their net-like texture. See the article **FUCUS**.

**ESCHAROTICS**, in pharmacy, medicines which produce eschars. See **ESCHAR**.

**ESCHEAT**, in law, signifies any lands or tenements that casually fall to a lord within his manor, by way of forfeiture, or by the death of his tenant, without any heirs general or special.

The word escheat is sometimes used for the place or circuit within which the king or other lord is entitled to escheats; also for a writ, to recover the same from the person in possession after the tenant's death.

**ESCHEATOR**, in our old customs, an officer formerly appointed in every county, to make inquests of escheats due to the king; but since abolishing the court of wards, has been laid aside as useless.

**ESCHELLES**, a town of Savoy, sixteen miles south-west of Chamberry.

**ESCHEVIN**, or **ECHEVIN**. See the article **ECHEVIN**.

**ESCHRA.**

**ESCHRAKITES**, in matters of religion, a sect of mahometans, who believe that man's sovereign good consists in the contemplation of God. They avoid all manner of vice, and appear always in good humour, despising the sensual paradise of Mahomet. The most able preachers, in the royal mosques, are of this sect.

**ESCHYNOMENOUS**, or **ÆSCHYNOMENOUS**. See **ÆSCHYNOMENOUS**.

**ESCLAIRCISSEMENT**, a french term adopted into our language, signifying the explication or clearing up of some difficulty or obscurity.

**ESCLATTE'**, in heraldry, signifies a thing forcibly broken, or rather a shield that has been broken and shattered with the stroke of a battle-ax.

**ESCORT**, in the art of war, the same with convoy. See the article **CONVOY**.

**ESCROW**, among lawyers, a deed delivered to a third person, to be the deed of the party making it upon a future condition, that when a certain thing is performed, it shall be delivered to the party to whom it was made, to take effect as the deed of the person first delivering it.

**ESCUAGE**, in our old customs, a kind of knight-service, called service of the shield, by which the tenant was bound to follow his lord to the wars at his own charge. It is also used for a sum of money paid to the lord, in lieu of such service; or even for a reasonable aid, levied by the lord upon his tenants who held by the knight's service.

**ESCULENT**, an appellation given to such plants, or the roots of them, as may be eaten: such are beets, carrots, artichokes, leeks, onions, parsneps, potatoes, radishes, scorzonera, &c. See the articles **BET**, **CARROT**, &c.

**ESCULUS**, the **HORSE-CHESNUT**, a genus of trees, belonging to the *heptandriamono-gynia* class of plants: its flower consists of five roundish petals; and the fruit is a roundish, echinated, and coriaceous capsule, with only one cell, in which are contained two roundish seeds, tho' sometimes only one.

**ESCURIAL**, a palace of the king of Spain, twenty-one miles north-west of Madrid; being one of the largest and most beautiful in the world. It has eleven thousand windows, fourteen thousand doors, one thousand eight hundred pillars, seventeen cloysters or piazzas, and twenty-two courts; with every convenience and ornament that can render a place agreeable

in so hot a climate, as an extensive park, groves, fountains, cascades, grottos, &c. **ESCUTCHEON**, or **SCUTCHEON**, in heraldry, is derived from the french *escusson*, and that from the latin *scutum*, and signifies the shield whereon coats of arms are represented.

Most nations, of the remotest antiquity, were wont to have their shields distinguished by certain marks painted on them; and to have such on their shields was a token of honour, none being permitted to have them till they had performed some honourable action.

The escutcheon, as used at present, is square, only rounded off at the bottom.

As to the bearings on shields, they might at first be arbitrary, according to the fancy of the bearer; but, in process of time, they came to be the gift of kings and generals, as the reward of honourable actions.

**ESCUTCHEON of pretence**, that on which a man carries his wife's coat of arms; being an heiress, and having issue by her. It is placed over the coat of the husband, who thereby shows forth his pretensions to her lands. See the article **HEIRESS**.

**Points of an ESCUTCHEON**. See **POINT**.

**Quartering of an ESCUTCHEON**. See the article **QUARTERING**.

**ESDRAS**, the name of two apocryphal books, usually bound up with the scriptures. They were always excluded the jewish canon, and are too absurd to be admitted as canonical by the papists themselves. The first book is chiefly historical, giving an account of the return of the Jews from the babylonish captivity, and the building of the second temple; the second is written in the prophetic way, pretending to visions and revelations, but such as are extremely ridiculous.

**ESENS**, a town of Westphalia, twenty-five miles north of Embden.

**ESK**, a river which forms part of the boundary between England and Scotland; and, running from north-east to south-west, falls into the Solway-frith: it gives name to the country of Eskdale.

**ESKIMAUX**, sometimes called New Britain, and Terra de Labrador, is an extensive country of North America, situated between 59° and 80° west long. and between 50° and 64° north lat.

It is bounded by Hudson's straits, which separate it from Greenland, on the north; by the Atlantic ocean, on the east; by the



the river and bay of St. Lawrence, on the south-east ; and by Hudson's bay, on the west.

**ESLINGEN**, an imperial city of Swabia, in Germany, seven miles south-east of Stutgard.

**ESLIRASS**, in law, persons particularly appointed or chosen to impanel juries.

**ESNECY**, in law, a private prerogative allowed to the eldest coparcener, where an estate is descended to daughters for want of an heir male, to choose first, after the estate of inheritance is divided.

It has been also extended to the eldest son and his issue, holding first, this right being *jus primogenituræ*.

**ESOX**, in ichthyology, a genus of malacopterygious fishes, wherein the membrane of the gills contains from twelve to fourteen officles or little bones, and there is a fin on the back very near the tail.

To this genus belong the lucius or pike, the acus or needle-fish, and the greatest squamose acus. See the articles **LUCIUS** and **ACUS**.

**ESPALIERS**, in gardening, are rows of trees planted about a whole garden or plantation, or in hedges, so as to inclose quarters or separate parts of a garden ; and are trained up regularly to a lattice of wood-work in a close hedge, for the defence of tender plants against the injuries of wind and weather. They are of admirable use and beauty in a kitchen-garden, serving not only to shelter the tender plants, but screen them from the sight of persons in the walks.

The trees chiefly planted for espaliers, are apples, pears, and some plums : some plant apples grafted upon paradise-stocks ; but, as these are of short duration, it is better to plant those grafted upon crab-stocks, or upon what the gardeners call dutch-stocks ; which will both cause them to bear sooner, and prevent their growing too luxuriant. The best kind of apples for this purpose, are the golden pippen, nonpareil, rennete, &c. and the best sorts of pear, are the jargonelle, blanquette, &c. These last, if designed for a strong moist soil, should be grafted upon quince-stocks ; but, if for a dry soil, upon free-stocks.

While the trees are young, it will be sufficient to drive a few stakes into the ground on each side of them ; fastening the branches to these in an horizontal position, as they are produced. This method will do for the three first years ; after which an espalier should be made of

ash-poles, whereof there must be two sorts, larger and smaller ; the former to be driven upright into the ground a foot asunder, and the latter, or slender poles, to be nailed across these, at about nine inches. Some prefer to this another sort of espalier, made of square timber cut to any size : these are, indeed, more slightly, but withal vastly more expensive.

When the espalier is thus framed, the branches are to be fastened to it with osier-twigs ; observing to train them in an horizontal position, and at equal distances. Fruit-trees thus managed, are preferable to any others ; not only as bearing better tasted fruit, but as taking up very little room in a garden, so as to be less hurtful to plants which grow in the quarters.

**ESPALIER**, in the french gardening, denotes a wall-tree. See **WALL-TREE**.

**ESPAULE** and **ESPAULEMENT**. See the articles **EPAULE** and **EPAULEMENT**.

**ESPERIE**, a city of Hungary, forty miles north of Tockay : it is remarkable for its salt mines.

**ESPINAL**, a town of Lorrain on the Moselle, thirty-five miles south-east of Nancy.

**ESPLANADE**, in fortification, the sloping of the parapet of the covered way towards the campaign. See **PARAPET** and **CAMPAIGN**.

It is the same with glacis, but begins to be antiquated, and is more properly the empty space betwixt a citadel and the houses of a town, commonly called a place of arms. See the articles **FORTIFICATION**, **COVERT-WAY**, **GLACIS**, and **CITADEL**.

**ESPLEES**, in law, the general products which lands yield, or the profit or commodity that is to be taken or made of a thing ; as of a common, the taking of grass by the mouths of the beasts that common there ; of an advowson, taking of tythes by the parson ; of wood, the selling of wood ; of an orchard, selling the fruit growing there ; of a mill, the taking of toll, &c.

These and such-like issues are termed esplees. In a writ of right of land, advowson, &c. the demandant must allege in his count, that he or his ancestors took the esplees of the thing demanded, otherwise the pleading is not good.

**ESPOUSALS**, in law, signify a contract or promise made between a man and a woman, to marry each other ; and in cases where marriage may be consummated, espousals go before. Marriage is termed an espoual *de præfenti*.

**ESQUI-**

**ESQUINANCY**, in medicine. See the article **QUINZY**.

**ESQUIRE**, *armiger*, was antiently the person that attended a knight in time of war, and carried his shield.

This title has not, for a long time, had any relation to the office of the person, as to carry arms, &c. Those to whom the title of esquire is now of right due, are all noblemen's younger sons, and the eldest sons of such younger sons; the eldest sons of knights, and their eldest sons; the officers of the king's courts, and of his household; counsellors at law, justices of the peace, &c. though those latter are only esquires in reputation: besides, a justice of the peace holds this title no longer than he is in commission, in case he is not otherwise qualified to bear it: but a sheriff of a county, who is a superior officer, retains the title of esquire during life, in consequence of the trust once reposed in him: the heads of some antient families are said to be esquires by prescription.

**ESQUIRES of the king**, are such as have that title by creation, wherein there is some formality used, as the putting about their necks a collar of SS, and bestowing on them a pair of silver-spurs, &c.

There are four esquires of the body to attend the king's person.

If an esquire be arraigned of high treason, he ought to be tried by a jury each whereof have 40s. of freehold, and 100l. in goods; and a knight has no other privilege. The heir apparent of an esquire, is privileged to keep grey-hounds, setting-dogs, or nets to take partridges and pheasants, though he cannot dispend 10l. of estate of inheritance, or the value of 30l. of estate for life.

**ESSART**, or **ASSART**, in law. See the article **ASSART**.

**ESSAY**, a trial or experiment for proving the quality of any thing; or an attempt to learn, whether or no any invention will succeed.

**ESSAY** in coinage. See the article **ASSAY**.

**ESSAY**, in literature, a peculiar kind of composition, the character whereof is to be free, easy, and natural; not tied to strict order or method, nor worked up and finished like a formal system.

An essay chiefly consists in occasional reflections, leaving the subject and then returning to it again; as the thoughts happen to occur to the mind. Montaign is said to have excelled in this species of writing; and the great lord Bacon is also

a pattern in this way. Mr. Locke calls his treatise on the human understanding, an Essay; and Mr. Pope calls his four ethic epistles, an Essay on Man.

**ESSAY-HATCH**, is the miner's term for a little trench or hole, which they dig to search for shoad or ore.

**ESSE**, in the schools, the same with essence. See the article **ESSENCE**.

**ESSECK**, a town of Hungary, near the confluence of the rivers Drave and Danube, with a bridge five miles over: it lies about eighty miles north-west of Belgrade.

**ESSEN**, a town of Westphalia, about ten miles north-east of Dusseldorp.

**ESSENCE**, in philosophy, that which constitutes the particular nature of each genus or kind, and distinguishes it from all others; being nothing but that abstract idea to which this name is affixed; so that every thing contained in it, is essential to that particular kind.

This Mr. Locke calls the nominal essence, in contradistinction to the real essence, or constitution of substances, on which this nominal essence depends: thus the nominal essence of gold, is that complex idea the word gold stands for; let it be, for instance, a body, yellow, weighty, malleable, fusible, and fixed: but its real essence is the constitution of its insensible parts, on which those qualities and all its other properties depend, which is wholly unknown to us.

That essence, in the ordinary use of the word, relates to sorts, appears from hence, that, if you take away the abstract ideas by which we sort individuals, and rank them under common names, then the thought of any thing essential to any of them instantly vanishes. We have no notion of the one without the other, which plainly shews their relation. No property is thought essential to any individual whatsoever, till the mind refers it to some sort or species of things; and then presently, according to the abstract idea of that sort, something is found essential; so that essential, or not essential, relates only to our abstract ideas, and the names annexed to them.

Substances are distinguished into sorts and species, by their nominal essence; and the species of things are nothing to us, but the ranking them under distinct names, according to the complex ideas in us, and not according to precise distinct real essences in them.

We cannot rank and sort things by their real essences, because we know them not.

Our faculties carry us no farther in the knowledge of substances, than a collection of those sensible ideas we observe in them. But the internal constitution whereon these essences depend, is utterly unknown to us. This is evident when we come to examine but the stones we tread on, or the iron we daily handle; we soon find that we know not their make, and can give no reason of the different qualities we find in them; and yet how infinitely these come short of the fine contrivance, and unconceivable real essences of plants and animals, every one knows.

But though the nominal essences of substances are made by the mind, they are not yet made so arbitrarily as those of mixed modes. To the making of any nominal essence, it is necessary, 1. That the ideas whereof it consists, have such an union as to make but one idea, how compounded soever. 2. That the particular idea so united be exactly the same, neither more nor less: for if two abstract complex ideas differ, either in number or sorts of their component parts, they make two different, and not one and the same essence. In the first of these, the mind, in making its complex ideas of substances, only follows nature, and puts none together which are not supposed to have an union in nature; for men observing certain qualities always joined and existing together, therein copy nature, and of ideas so united make their complex ones of substances.

Though the nominal essences of substances are all supposed to be copied from nature, yet they are all, or most of them, very imperfect: and since the composition of these complex ideas is in several men very different, we may conclude that these boundaries of species are in men and not as nature makes them; if, at least, there are in nature any such prefixed bounds. If the first sorting of individuals depends upon the mind of man, variously collecting the simple ideas that make the nominal essence of the lowest species, it is much more evident that the more comprehensive classes called genera, do so in forming more general ideas that may comprehend different sorts: the mind leaves out those qualities that distinguish them, and puts into its new collection only such ideas as are common to several sorts: thus by leaving out those qualities that are peculiar to gold, silver, &c. and by retaining a complex idea made

up of those that are common to each species, there is a new genus constituted, to which the name metal is annexed.

**ESSENCE**, in chemistry, signifies the balsamic part of any thing, separated from the thicker matter; so that wherever this is done by means of extraction, the balsamic part is called essence by way of eminence: sometimes thickened juices are called essences, but it is better to call these by their own name, to avoid confusion.

**ESSENDO QUIETUM DE TOLLONIO**, in law, a writ which lies for citizens, burgesses, &c. who by charter or prescription ought to be free from toll, in case the same is exacted of them.

**ESSENES, or ESSENIANS**, in jewish antiquity, one of the three antient sects among that people, who outdid the Pharisees in their most rigorous observances. They allowed a future state, but denied a resurrection from the dead. Their way of life was very singular: they did not marry, but adopted the children of others, whom they bred up in the institutions of their sect: they despised riches, and had all things in common; and never changed their cloaths, till they were entirely worn out. When initiated, they were strictly bound not to communicate the mysteries of their sect to others; and if any of their members were found guilty of enormous crimes, they were expelled.

Pliny tells us, that they dwelt on the west side of the lake of Asphaltites; that they were a solitary kind of men, living without women or money, and feeding upon the fruit of the palm-tree: he adds, that they were constantly recruited by new comers, whom the surges of ill fortune had made weary of the world; in which manner the sect was kept up for several thousands of years, without any being born among them. The reason why we find no mention made of them in the New Testament, may be their reclusé and retired way of life, no less than their great simplicity and honesty, whereby they lay open to no censure or reproof.

**ESSENTIA, ESSENCE**. See the article **ESSENCE**.

**ESSENTIAL**, something necessarily belonging to the essence or nature of a thing, from which it cannot be conceived distinct: thus the primary qualities of bodies, as extension, figure, number, &c. are essential or inseparable from them in all their changes and alterations. See the article **QUALITY**.

**ESSENTIAL**

**ESSENTIAL OIL**, that procured from plants by distillation. See the article **OIL**.

**ESSENTIAL SALTS**, those obtained from vegetable juices by crystallization. See the article **SALT**.

**ESSEX**, a county of England, bounded by Suffolk, on the north; by the german sea, on the east; by the river Thames, which divides it from Kent, on the south; and by Middlesex and Hertfordshire, on the west.

**ESSLISORS**, or **ESLISORS**. See the article **ESLISORS**.

**ESSOIN**, in law, an excuse for a person summoned to appear and answer to an action, on account of sickness or other just cause of his absence.

It is a kind of imparlance or craving of longer time, and obtains in real, personal, and mixed actions.

There are divers essoins, as *de ultra mare*, when the defendant is beyond sea, whereby he is allowed forty days; in an expedition to the holy land, a year and a day; infirmity, called common esoin, when he is sick in bed; and, lastly, in the king's service.

**ESSOIN-DAY**, is regularly the first day of every term, though the fourth day after is also allowed by way of indulgence.

**ESSOIN DE MALO VILLÆ**, is where the defendant appears in court, but before pleading, falls sick in a certain village: this is also allowed, if found true.

**ESSOINS** and **PROFFERS**. See **PROFFER**.

**ESSORANT**, in heraldry, denotes a bird standing on the ground with its wings expanded, as if it had been wet, and were drying itself.

**ESTABLISHMENT of dower**, in law, an assurance of dower made to the wife by the husband, or some friend of his, on marriage. See the article **DOWER**.

**ESTAMPES**, a town of France, twenty-five miles south of Paris.

**ESTAPLES**, a port-town of Picardy, in France, twelve miles south of Boulogne.

**ESTATE**, in law, signifies the title or interest that a person has in lands, tenements, or other effects; comprehending the whole in which a person hath any property, and will pass the same.

Estates are either real or personal; otherwise distinguished into freeholds, which descend to heirs; or chattels, that go to executors or administrators. See the articles **FREEHOLD**, &c.

A fee simple is the amplest estate our law admits of. See the article **FREE**.

Estates are obtained several ways, as by

descent from a father to a son; by conveyance or grant, from one person to another; by gift or purchase; or by deed or will. See the articles **HEIR**, **CONVEYANCE**, **GRANT**, &c.

**ESTATES**, in a political sense, is used either to denote the dominions of some prince, or the general classes into which the people are divided.

In Britain, the estates are the king, lords, and commons; or rather the lords and commons, who meet the king in parliament, for reforming abuses, and enacting good and wholesome laws. See the articles **STATUTE**, **PARLIAMENT**, &c. In France, there are three estates, viz. the clergy, the nobility, and the people, who make the third estate.

**ESTATES GENERAL**, in the polity of Holland. See **STATES-GENERAL**.

**ESTE**, a town of Italy, fifteen miles south-west of Padua, and subject to Venice.

**ESTELLA**, a town of Navarre, in Spain, twenty miles south-west of Pampeluna.

**ESTENA**, a town of Spain, in the province of Granada, forty-five miles north of Malaga.

**ESTERLING**, or **STERLING**. See the article **STERLING**.

**ESTETE**, in heraldry, denotes the heads of beasts torn off by main force. See the articles **ARACHE** and **ERASED**.

**ESTHER**, a canonical book of the Old Testament, containing the history of a jewess virgin, dwelling with her uncle Mordecai at Shushan, in the reign of Ahasuerus, one of the kings of Persia.

The great beauty of this maid raised her to the throne of Persia, whereby she had an opportunity to save her countrymen, whose destruction was plotted by Haman, a favourite of that prince.

The learned are not agreed who this Ahasuerus was. Archbishop Usher supposes him to be Darius Hystaspes, and Artystona to be Esther. Scaliger makes him the same with Xerxes, and his queen Hamestris to be Esther. Josephus, on the contrary, positively asserts, that the Ahasuerus of the scriptures, is the Artaxerxes Longimanus of profane story; and the septuagint, throughout the whole book of Esther, translate Ahasuerus by Artaxerxes. Most people subscribe to this last opinion; and, indeed, the extraordinary kindness shewed by Artaxerxes to the Jews, can scarce be accounted for otherwise, than by supposing that they had so powerful an advocate as Esther to solicit for them.

**ESTIVAL**,

**ESTIVAL**, or **ÆSTIVAL**. See the article **ÆSTIVAL**.

**ESTOILE'E**, or **CROSS ESTOILE'E**, in heraldry, a star with only four long rays in form of a cross; and, accordingly, broad in the center, and terminating in sharp points.

**ESTONIA**, a province subject to Russia, on the north of Livonia.

**ESTOPPEL**, in law, an impediment or bar to an action, which arises from a person's own fact; or rather, where he is forbid by law to speak against his deed, which he may not do, even to plead the truth. Thus where a person is bound in a bond by such a name, and being afterwards sued by that name on the obligation, he shall not be allowed to say he is misnamed, but shall answer according to the bond, though it be wrong. Hence the parties in all deeds are estopped from saying any thing against them. However, a plaintiff is not estopped from saying any thing against what he had said in his writ or declaration; and though parties be estopped, yet juries are not so, who may find things out of the record.

**ESTOVERS**, in law, is most generally taken for certain allowances of wood made to tenants, as house-bote, hedge-bote, and plough-bote; which three are comprehended under reasonable estovers.

**ESTRANGEL**, **ESTRANGELUS** CHARACTER, in the syriac grammar, a particular species or form of syriac letters, serving as the majuscule letters of that language, and by several supposed to be the true antient chaldean character.

**ESTRAPADE**, in the manege, the defence of a horse that will not obey, who, to get rid of his rider, rises mightily before; and, while his forehead is yet in the air, yerks furiously with his hind legs, striking higher than his head was before; and during this counter-time, goes back rather than advances.

**ESTRAY**, in law, any beast not wild that is found within a lordship, and owned by nobody: in which case, being cried according to law in the two next market towns adjacent, and not claimed in a year and a day by the owner, it becomes the property of the lord of the manor, or liberty wherein it was found.

If the beast proclaimed stray to another lordship within the year, the first lord cannot retake it; and where the estray was never duly proclaimed, the owner may take it again, at any time, upon

paying the lord for keeping thereof: likewise the owner may seize an estray, without telling the marks or proving his property, which may be done at the trial, if contested: and here the tendering of amends is good, without shewing any particular sum.

**ESTREAT**, in law, a true copy, note, or duplicate of an original writing or record, especially fines, amercements, penalties, &c. set down and imposed in the rolls of a court, to be levied by the bailiff, or other officer.

Estreats relate generally to fines for crimes and offences, defaults and omissions of persons concerned in suits, and likewise of officers. Non-appearance of defendants and jurors, &c. and before process issues to levy forfeitures on recognizances to the king's use, the recognizances must be first estreated into the exchequer by sheriffs of counties. Fines, post fines, and forfeitures, are to be estreated twice a year on pain of 50*l*. and it is the course of the king's bench to send their estreats into the exchequer on the last days of the two issuable terms.

**ESTREMADURA**, a province of Spain, bounded by Leon, on the north; by the two Castiles, on the east; by Andalusia, on the south; and by the province of Alentejo, in Portugal, on the west.

**ESTREMADURA** is also a province of Portugal, lying north of Alentejo, and westward of spanish Estremadura. Lisbon is its capital, as also of the kingdom.

**ESTREMOS**, a town of Alentejo, in Portugal, eighty-five miles south-east of Lisbon.

**ESTREPEMENT**, in law, any spoil made by tenants for life on any lands, &c. to the prejudice of the reversioner: it is also taken to signify the making land barren, by continual plowing and sowing, and thereby drawing out the heart of the ground without manuring, or rather good husbandry, by which means it is impaired.

It may likewise be applied to the cutting down of trees, or lopping them farther than the law allows.

There is also a writ of estrepeement that lies in two cases, *viz.* the one is where a person having an action depending, as a freedman or writ of right, &c. sues to prohibit the tenant from making waste. The other is for the demandant, who is adjudged to recover seisin of the land, before execution, sued out by the writ habere

facias possessionem, in order to prevent waste being made before he gets into possession.

**ESULA**, in botany, a kind of spurge, comprehended under the euphorbia of Linnaeus.

It is one of the sharpest and most acrid spurges, and therefore hardly safe: it purges violently, both by vomit and stool. Some recommend it in dropfies, but it should be used with great caution; and it is a good method to macerate it a day or two in vinegar, before it is used.

**ESURINE SALTS**, such as are of a corroding, fretting, and eating nature; abounding chiefly in places near the sea-side, and where great quantities of coals are burnt, as appears from the speedy rusting of iron bars in the windows of houses built in such places.

**ESWEGEN**, or **ESCHWEGE**, a town of Germany, twenty-five miles south-east of the city of Cassel.

**ETAPPE**, a term used, in the french armies, for the provisions and forrage allowed an army in their rout through a kingdom, whether going into winter-quarters, or returning to take the field. Hence, *etapier* is the undertaker or person who contracts with the country or territory, for furnishing the said provisions.

**ETCHING**, a method of engraving on copper, in which the lines or strokes, instead of being cut with a tool or graver, are eaten in with aquafortis.

Etching is done with more ease and expedition than engraving: it requires fewer instruments, and represents most kind of subjects better and more agreeable to nature, as landscapes, ruins, grounds, and all small, faint, loose, remote objects, buildings, &c. See **ENGRAVING**.

The method of etching is as follows: choose the copper-plate as directed for engraving, and furnish yourself with a piece of ground, tied up in a bit of thin silk, kept very clean, to be laid upon the plate when both have been warmed; proper needles to hatch with on the ground; a pencil or brush, to wipe away the bits of ground which rise after hatching; a polisher; two or three gravers; a pair of compasses, to measure distances and draw circles; a ruler, to hatch straight lines; green wax, to make the wall round the edges of the plate, to contain the aquafortis; an oil-stone; a bottle of aquafortis; some red lead, to colour the back-side of the copy; a stiff, and a hand-vice,

to hold the plate over the candle. See the articles **NEEDLE**, **GRAVER**, **POLISHER**, **COMPASS**, &c.

To make the ground, take three ounces of asphaltum, two ounces of clean rosin, half an ounce of burgundy-pitch, three ounces of black wax, and three ounces of virgin's wax; let all these be melted in a clean earthen pipkin over a slow fire, stirring it all the time with a small stick; if it burn to the bottom, it is spoiled. After the ingredients are well melted, and it boils up, put it into a pan of fair water; and before it be quite cold, take it out, and roll it into small lumps to be kept from dust: this ground is what others call the varnish. The next thing is to clean the plate to receive the ground: take a piece of lisking, roll it up as big as an egg, tie it very tight, so as to make it a rubber, and having dropped a small quantity of sweet oil, and added a little powder of rotten-stone on the plate, rub it with this ball, till it will almost shew your face. Then wipe it all off with a clean rag, and after that, make it quite dry with another clean rag, and a little fine whiting.

The next thing is to lay on the varnish; to do which aright you must take a hand-vice, and fix it at the middle of one part of the plate, with a piece of paper between the teeth of the hand-vice and the plate, to prevent the marks of the teeth: then laying the plate on a chaffing-dish, with a small charcoal fire in it, till the plate be so hot, that, by spitting on the backside, the wet will fly off: rub the plate with the ground tied up in silk, till it be covered all over; and after that dab the plate with a piece of cotton wrapped up in silk till the ground be quite smooth, keeping the plate a little warm all the time. The varnish being thus smoothed upon the plate, it must be blacked in the following manner: Take a thick tallow candle that burns clear, with a short snuff, and having driven two nails into the wall, to let it rest upon, place the plate against the wall with the varnish side downward, and take care not to touch the ground with your fingers: then taking the candle, apply the flame to the varnish as close as possible, without touching the varnish with the snuff of the candle, and guide the flame all over it, till it become perfectly black. After this is done, and the plate dry, the design is traced with a needle through the varnish, and a rim or border

border of wax is raised round the circumference of the plate; and then the artist has a composition of common varnish and lamp-black, made very thin, wherewith he covers the parts that are not to be bitten, by means of a hair pencil. And he is every now and then covering or uncovering this or that part of the design, as occasion may require; the conduct of the aquafortis being the principal concern, on which the effect of the print very much depends. The operator must be attentive to the ground, that it does not fail in any part, and where it does, to stop up the place with the above composition. The plate is defended from the aquafortis every where, but in the lines or hatches cut through it with the needle, through which the water eats into the copper to the depth required; remembering to keep it stirring with a feather all the while, which done, it is to be poured off again.

Single aquafortis is most commonly used; and if it be too strong, mix it with vinegar, otherwise it will make the work very hard, and sometimes break up the ground: the aquafortis having done its part, the ground is taken off, and the plate washed and dried: after which nothing remains for the artist but to examine the work with his graver, to touch it up, and heighten it where the aquafortis has missed.

And, lastly, it is to be remembered, that a fresh dip of aquafortis is never given, without first washing out the plate in fair water, and drying it at the fire.

**ETERNITY**, an attribute of God, expressing his infinite or endless duration. See the article **GOD**.

According to Mr. Locke, we come by the idea of eternity, by being able to repeat any part of time, as a year, as often as we will, without ever coming to an end.

**ETHELING**, or **ATHELING**. See the article **ATHELING**.

**ETHER** and **ÆTHERIAL**. See the articles **ÆTHER** and **ÆTHERIAL**.

**ETHICS**, or **MORALITY**, the science of manners or duty, which it traces from man's nature and condition, and shews to terminate in his happiness; or, in other words, it is the knowledge of our duty and felicity; or the art of being virtuous and happy.

Moral philosophy inquires, not how man might have been, but how he is constituted; not into what principles or dispositions his actions may be artfully resolved,

but from what principles and dispositions they actually flow; not what he may, by education, habit, or foreign influence, come to be or do, but what by his nature, or original frame, he is framed to be and do. From a view, therefore, of man's faculties, appetites and passions, it appears, that the health and perfection of man must be in the supremacy of conscience and reason, and in the subordination of the passions and affections to their authority and direction; and virtue or goodness must consist in acting agreeably to this order and reason.

See the articles **APPETITE**, **CONSCIENCE**, **REASON**, **HAPPINESS**, &c.

It is true, some eminent philosophers have attempted to lay the foundation of morals much deeper, and on a more large and firm bottom, *viz.* the natures and reasons, the truth and fitnesses of things. Senses and affections, they tell us, are vague and precarious; and though they were not, yet irrational principles of action, and consequently very improper foundations, on which to rest the eternal and immutable obligations of morality. Hence they talk much of the abstract natures and reasons of things, of eternal differences, unalterable relations, fitnesses and unfitnesses resulting from those relations; and from these eternal reasons, differences, relations, and their consequent fitnesses, they suppose moral obligation to arise. A conduct agreeable to them, or, in other words, to truth, they call virtue; and the reverse, vice. See the articles **VIRTUE** and **VICE**.

But the truth is, that we might perceive all the possible relations, differences, and reasons of things, and yet be wholly indifferent to this or that conduct, unless we were endued with some sense or affection, by which we approved and loved the one, and disapproved and disliked the other conduct. Reason may perceive a fitness to a certain end, but without some sense or affection we cannot propose, or indeed have any idea of an end; and, without an end, we cannot conceive any inducement to action. Therefore, before we can understand the natures, reasons, and fitnesses of things, which are said to be the foundation of morals, we must know what natures are meant, to what ends they are fitted, and from what principles or affections they are prompted to act; otherwise we cannot judge of the duty required, or of the conduct becoming that being whom we suppose under

moral obligation. But let the natures be once given, and the relations which subsist among them be ascertained, we can then determine what conduct will be obligatory to such natures, and adapted to their condition and œconomy. And to the same natures, placed in the same relations, the same conduct will be eternally and invariably proper and obligatory.

Besides, to call morality a conformity to truth, gives no idea, no characteristic of it, but what seems equally applicable to vice. For whatever propositions are predicable of virtue, as, that it flows from good affections, or is agreeable to the order of our nature, tends to produce happiness, is beheld with approbation, and the like; the contrary propositions are equally true, and may be equally predicated of vice.

Another set of philosophers establish morals upon the will or positive appointment of the Deity, and call virtue a conformity to that will, or appointment. All obligation, they say, supposes one who obliges, or who has a right to prescribe, and can reward the obedient, and punish the disobedient. This can be none but the Creator. His will, therefore, is our law, which we are bound to obey. And this, they tell us, is only sufficient to bind or oblige such imperfect and corrupt creatures as we are, who are but feebly moved with a sense of the beauty and excellency of virtue, and strongly swayed by passion, or views of interest.

This scheme of morality entirely coincides with that deduced from our inward structure and condition, since these are the effects of the divine will. Whatever therefore is agreeable, or correspondent to our inward structure, must likewise be agreeable, or correspond to the will of God. So that all the indications, or sanctions of our duty, which are declared or enforced by our structure, are, and may be, considered as indications or sanctions of the will of our Creator. If these indications, thro' inattention to, or abuse of our structure, prove insufficient to declare; or if these sanctions, thro' the weakness or wickedness of men, prove insufficient to enforce obedience to the divine will, and the Deity is pleased to add new indications, or new sanctions; these additional indications and sanctions cannot, and are not supposed, by the assertors of this scheme, to add any new

duty, or new moral obligation; but only a new and purer promulgation of our duty, or a new and stronger sanction or motive from interest, to perform that duty, and to fulfil that obligation to which we were bound before. It makes no difference, as to the matter of obligation, after what manner the will of our Creator is enforced, or declared to us, whether by word or writ, or by certain inward notices and determinations of our own minds, arising according to a necessary law of our nature. Again, if the scheme of duty, as deduced from moral perceptions, and the affections of our nature, be thought too slight a foundation on which to rest morality, because these are found insufficient to bind, or rather to compel men to their duty, we fear the same objection will militate against the scheme of conformity to the divine will, since all the declarations and sanctions thereof have not hitherto had their due effect, in producing a thorough and universal reformation.

When some speak of the will of God, as the rule of duty, they do not certainly mean a blind, arbitrary principle of action, but such a principle as is directed by reason, and governed by wisdom, or a regard to certain ends in preference to others: for unless we suppose some principle in the Deity analogous to our sense of obligation, some antecedent affection, or determination of his nature, to prefer some ends before others, we cannot assign any sufficient reason why he should will one thing more than another, or have any election at all. Whatever therefore is the ground of his choice, or will, must be the ground of obligation, and not the choice or will itself. That this is the case, appears farther from the common distinction which divines and philosophers make between moral and positive commands and duties. The former they think obligatory antecedent to will, or at least to any declaration of it; the latter, obligatory only in consequence of a positive appointment of the divine will. But what foundation can there be for this distinction, if all duty and obligation be equally the result of mere will?

Before we conclude this article, it will be proper to say something of the extraordinary hypothesis of Hobbes, concerning the foundation of morality. This philosopher, who saw his country involved



volved in all the distraction and misery of a civil war, seems to have taken too narrow and partial a view of our nature, and has therefore drawn it in a very odious and uncomfortable light. Next to the desire of self-preservation, he makes the love of glory and of power to be the governing passions in man; and from these, by an arbitrary, unnatural, and unsupported hypothesis, contrary to common experience, and common language, he attempts to deduce all the other passions which inflame the minds, and influence the manners of men. According to him, all men are equal, all desire and have a right to the same things, and want to excel each other in power and honour; but as it is impossible for all to possess the same things, or to obtain a preeminence in power and honour, hence must arise a state of war and mutual carnage; which is what he calls a state of nature. But this shrewd philosopher subjoins, that men being aware that such a state must terminate in their own destruction, agreed to surrender their private unlimited right into the hands of the majority, or such as the majority should appoint, and to subject themselves for the future to common laws, or to common judges or magistrates. In consequence of this surrender, and of this mutual compact or agreement, they are secured against mutual hostilities, and bound or obliged to a peaceable behaviour; so that it is no longer lawful or just (he certainly means safe or prudent) to invade and encroach on one another, since this would be a violation of his promise. But one may ask him, what obligation is a man under to keep his promise, or stand to his compact, if there be no obligation, no moral tie distinct from that promise? On the whole, his state of nature is a mere chimera, and the superstructure he has raised on it no less so.

**ETHIOPIA**, or **ÆTHIOPIA**, a very extensive country of Africa, comprehending Abyssinia, Nubia, and Abex: it is bounded by Egypt, and the desert of Barca on the north, by the Red sea, and Indian Ocean on the east, by Anian, and the unknown parts of Africa on the south, and by other unknown countries on the west. See **ABEX** and **NUBIA**.

**ETHIOPIC YEAR**. See the article **YEAR**.

**ETHMOIDAL**, in anatomy, one of the common sutures of the skull, which goes round the os ethmoides, from which it

derives its name, separating it from the bone in contact with it. See the articles **SUTURE** and **ETHMOIDES**.

**ETHMOIDES OS**, in anatomy, the same with cribriform os, or cubiforme. See the article **CRIBROSUM**.

**ETHNARCH**, **ETHNARCHA**. See the article **ÆCHMALOTARCHA**.

**ETHNOPHRONES**, in church history, heretics of the seventh century, who, professing christianity, joined thereto all the ceremonies and follies of paganism, such as judicial astrology, divinations of all kinds, &c. and who observed all the feasts, times, and seasons of the Gentiles.

**ETHOPOEIA**, or **ETHOLOGY**, in rhetoric, a draught, or description, expressing the manners, passions, genius, tempers, aims, &c. of any person. Such is that noted picture of Cataline, as drawn by Sallust: *fuit magna vi & animi*, &c. "he was a man of great vigour both of body and mind; but of a disposition extremely profligate and depraved. From his youth he took pleasure in civil wars, massacres, depredations, and intestine broils; and in these he employed his younger days. His body was formed for enduring cold, hunger, and want of rest, to a degree indeed incredible: his spirit was daring, subtle, and changeable: he was expert in all the arts of simulation and dissimulation, covetous of what belonged to others, lavish of his own, violent in his passions: he had eloquence enough, but a small share of wisdom: his boundless soul was constantly engaged in extravagant and romantic projects, too high to be attempted."

**ETHUSA**, **FOOL'S PARSLEY**, in botany, a genus of the *pentandria-digynia* class of plants, the general corolla of which is commonly uniform; the partial one consists of five inflexo-cordated, unequal petals: the fruit is naked, of a roundish oval figure, and separable in two parts: the seeds are two, roundish, striated, and thence a third part plane.

**ETNA**, or mount **GIBELLO**, a volcano, or burning mountain of Sicily, situated fifty miles south-west of Messina, and twenty west of Catania. See **VULCANO**.

**ETRUSCA TERRA**, **TUSCAN EARTH**, a species of bole. See the article **BOLE**.

**ETYMOLOGY**, that part of grammar which considers and explains the origin and derivation of words, in order to arrive

arrive at their first and primary signification, whence Quintilian calls it *originatio*.

A judicious enquiry into etymologies, is thought by some of considerable use; because nations, who value themselves upon their antiquity, have always looked on the antiquity of their language as one of the best titles they could plead; and the etymologist, by seeking the true and original reason of the notions and ideas affixed to each word and expression, may often furnish an argument of antiquity, from the traces remaining thereof, compared with the antient uses. Then that etymologies are necessary for the thorough understanding of a language.

'Tis objected, however, that the art is arbitrary, and built altogether on conjectures and appearances; and the etymologists are charged with deriving their words from where they please; and indeed it is no easy matter to go back into the antient british and gaulish ages, and to follow, as it were, by the track, the various imperceptible alterations a language has undergone from age to age; and as those alterations have sometimes been merely owing to caprice, 'tis easy to take a mere imagination or conjecture for a regular analogy: so that it is no wonder the public should be prejudiced against a science, which seems to stand on so precarious a footing. It must certainly be owned, that etymologies are frequently so far fetched, that one can scarce see any resemblance or correspondence therein. Quintilian has shewn, that the antient etymologists, notwithstanding all their learning, fell into very ridiculous derivations.

The etymologies of our english words has been derived from the Saxon, Welch, Walloon, Danish, Latin, Greek, &c. See the article ENGLISH.

**EU**, a port town of Normandy, in France, fifteen miles north-east of Dieppe.

**EVACUANTS**, in pharmacy, are properly such medicines as diminish the animal fluids, by throwing out some morbid or redundant humour, or such as thin, attenuate, and promote the motion and circulation thereof. See the article ATTENUANTS, &c.

Evacuating medicines are prejudicial in intermitting fevers; are prejudicial as they weaken, exhaust the most fluid juices, and disturb the concoctions and

digestions which are here more especially necessary.

**EVACUATION**, in medicine, the art of diminishing, emptying, or attenuating the humours of the body.

Evacuations are, by Dr. Pringle, much recommended in the bilious fever and dysentery: but this sort of medicine is to be sparingly used in malignant fevers: in wounds of the head the best evacuations are plentiful bleeding and purging of the bowels; both which are to be made at one and the same time, as plentifully as the patient's strength will permit; and to be repeated again as often as necessary, if you find the symptoms relieved after their administration.

Evacuations are bad in nausea, from a disturbance of the spirits; but are of great use in curing the delirium in fevers: the provoking the menses in women, is to be attempted by such remedies as mollify and relax, and not by those called emmenagoges, most of which increase the impetus of the circulation, except in women of a cold and lax habit: blood-letting likewise supplies the deficiency of the piles, or menstrual discharge in men, by making this artificial evacuation of blood in a part the most remote from the head. But all these evacuations are only of use where the vessels are distended with too great a quantity of blood, or when the force of the circulation is too great. In intermitting fevers evacuations are very imprudent. In inflammatory disorders, where the chief intention should also be to diminish the force of the blood, to thin it, and to relax the fibres, evacuations, such as bleeding, purging, vomiting, attenuants, and diaphoretics, are the chief remedies.

**EVANGELIST**, a general name given to those who write, or preach the gospel of Jesus Christ.

The word is of greek origin, signifying one who publishes glad tidings, or is the messenger of good news.

According to Hooker, evangelists were presbyters of principal sufficiency, whom the apostle sent abroad, and used as agents in ecclesiastical affairs, wherever they saw need.

The term evangelist, however, is at present confined to the writers of the four gospels. See the article GOSPEL.

**EVANID**, a name given by some authors to such colours as are of no long duration,

ration, as those in the rainbow, in clouds before and after sun-set, &c.

Evanid colours are also called fantastical and emphatical colours.

**EVANTES**, in antiquity, the priestesses of Bacchus, thus called, by reason, that in celebrating the orgia, they ran about as if distracted, crying, *evan, evan, clé evan*. See **BACCHANALIA**.

**EVAPORATION**, in chemistry, the setting a liquor in a gentle heat to discharge its superfluous humidity, reduce it to a proper consistence, or obtain its dry remainder.

Evaporation may be accounted for from hence, that when the particles are so far separated by heat, as to be without each others attraction, they then begin to repel each other, and thus will seem to rise from the surface of the fluid in the form of a vapour, or body of particles, which are at equal distances from each other; and becoming thus specifically lighter than the same bulk of airy particles, they will rise in the fluid body of the air, where they form clouds, meteors, &c. See **CLOUD**, **METEOR**, &c.

**EVASION**, among lawyers, denotes a cunning or subtle endeavouring to set aside, or escape the punishment of the law; as where one says to another, that he will not strike him, but he will give him a shilling to strike first: in such a case, if the person who gives the first stroke be killed, it is murder, for no person shall evade the justice of the law, by any such pretence to screen his malice.

**EVATES**, a branch or division of the druids, or antient celtic philosophers. Strabo divides the british and gaulish philosophers into three sects, bards, *βαρδαι*, evates, *ουαται*, and druids, *δρυιδαι*. He adds, that the bards were the poets and musicians; the evates the priests and naturalists; and the druids were moralists as well as naturalists: but Marcellus and Hornius reduce them all to two sects, *viz.* the bards and druids.

**EUBAGES**, an order of priests, or philosophers, among the antient Celtæ, or Gauls: some will have the eubages to be the same with the druids, and saronidæ of Diodorus; and others, that they were the same with what Strabo calls evates.

**EUCCHARIST**, *ευχαριςτια*, the sacrament of the Lord's supper, properly signifies giving of thanks.

This sacrament was instituted by Christ himself, and the participation of it called communion. See **COMMUNION**.

As to the manner of celebrating the eucharist, among the antient Christians, after the customary oblations were made, the deacon brought water to the bishop and presbyters, standing round the table, to wash their hands, according to that of the psalmist, "I will wash my hands" in innocency, and so will I compass "thy altar, O Lord." Then the deacon cried out aloud, "Mutually embrace" and kiss each other;" which being done, the whole congregation prayed for the universal peace and welfare of the church, for the tranquility and repose of the world, for the prosperity of the age, for wholesome weather, and for all ranks and degrees of men. After this followed mutual salutations of the minister and people; and then the bishop, or presbyter, having sanctified the elements, by a solemn benediction, he brake the bread, and delivered it to the deacon, who distributed it to the communicants; and after that the cup. Their sacramental wine was usually diluted, or mixed with water. During the time of administration, they sang hymns and psalms, and having concluded with prayer and thanksgiving, the people saluted each other with a kiss of peace, and so the assembly broke up.

**EUCHITES**, in church-history, heretics, otherwise called Messalians. See the article **MESSALIANS**.

**EUCHOLOGIUM**, *ευχολογιον*, in the greek church, the ritual, or book of common-prayer of that church. See **RITUAL**.

**EUDISTS**, a congregation of missionary priests, in France, associated under the name and title of Jesus and Mary. It is governed by a superior, who receives his power from the bishops of each diocese, where they have an establishment.

**EUDOXIANS**, in church-history, a branch of Arians. See **ARIANS**.

**EVE**, the same with vigil. See **VIGIL**.

**EVECTION** of the moon, the same with libration. See the article **LIBRATION**.

**EVEN NUMBER**, in arithmetic, that which can be divided into two equal parts: such are 4, 10, 40, &c.

A number is said to be evenly even, when being even itself, it is measured by an even one, an even number of times: such is 32, as being measured by the even number 8, an even number of times 4. Evenly odd number is, that which an even number doth measure by an odd one: such is 30, which 2 or 6, both even numbers, do measure by 15 or 5, odd ones.

**EVERARD'S SLIDING-RULE.** See the article **SLIDING-RULE**.

**EVERDING**, a town of Austria, in Germany, situated on the Danube, twelve miles west of Lints.

**EVER-GREEN**, in gardening, a species of perennials, which continue their verdure, leaves, &c. all the year : such are hollies, phillyria's; laurustinus's, bays, pines, firs; cedars of Lebanon, &c.

**EVERLASTING-FLOWER**, in botany, a name given to the amaranthoides.

**EVERLASTING-PEA**, a genus of plants, otherwise called lathyrus.

**EVESDROPPERS**, in law persons who stand under the eves, walls, or windows of a house, by day or by night, to listen after news, and carry it to others, thereby raising strife and contention in the neighbourhood. They are punishable in the court-leet, or quarter-sessions.

**EVESHAM**, a borough-town thirteen miles south-east of Worcester, which sends two members to parliament.

**EUGENIA**, the **SILVER-TREE**, in botany, a genus of the *icosandra-monogynia* class of plants, the corolla whereof consists of four oblong, obtuse, concave petals, twice as large as the cup : the fruit is a quadrangular, coronated drupe, containing only one cell : the seed is a roundish, smooth nut.

**EUGUBIO**, a town and bishop's see of Italy, in the duchy of Urbino, and thirty-five miles south of that city.

**EVIAN**, a town of Savoy, situated twenty-five miles north-east of Geneva, on the south side of the lake of Geneva.

**EVICITION**, in law, signifies a recovery of lands, or tenements by law.

When lands, &c. are evicted before rent reserved upon a lease becomes due, the lessee is not liable to pay any rent. Likewise, if on an exchange of lands, either of the parties is evicted of the land given in exchange, the party evicted may, in that case, re-enter his own lands. And a widow being evicted of her thirds, shall be endowed in the other lands of the heir.

**EVIDENCE**, according to the Epicureans, is nothing else than that kind of certitude obtained by the senses, which, in the opinion of these philosophers, are the primary criterion of truth.

By evidence of sense the epicureans mean that species, or image, exhibited by the sense, or phantasy, which, when all impediments to a just judging, as distance, motion, medium, &c. are removed, can-

not be contradicted, or gain said : wherefore the question being put, whether or no a thing be just as it appears ; the answer is not given till it have been tried and examined all the ways, and by all the senses that it can be an object of. Some distinguish evidence into objective and formal.

Objective evidence, they say, consists in the clearness or perspicuity of the object ; or the object itself so constituted as that it may be clearly and distinctly known. An object may be clearly known, either immediately from the bare explication of the terms of a proposition ; or mediate, that is, we may arrive at a clear and distinct knowledge of it, by means of some medium ; thus space, according to the Epicureans, becomes evident by reason of motion, because there can be no motion where there is no space.

Formal evidence is the act of the intellect considered as clear and distinct ; and this is also immediate, or such as consists or depends upon the primary principles ; or it is mediate, and requires some medium whose attribute agrees with the subject of the proposition. The former consists in a certain natural light of the intellect, which is acquired without any study or pains : the latter is found nowhere but in the conclusion of demonstration, and is therefore termed mediate evidence. See the article **DEMONSTRATION**.

Others divide evidence into moral, physical, and metaphysical ; that is, by how many means the truth appears, by so many is the evidence said to arise : thus, a thing is said to be morally evident, so far as I have a distinct knowledge or notion thereof by unexceptionable witnesses. See the article **CERTITUDE**. Physically, so far as natural sense and reason, pointing out any thing, convinces me thereof. Metaphysically, when I enter so fully and clearly into the essence of any thing that nothing can be clearer.

But whatever may be the sentiments of these philosophers concerning evidence, says Chauvinus, this should at least be granted, that the evidence of human knowledge, of what kind soever it be, is not absolute, but comparative : that is, that there is no act in human knowledge quite void of all confusion.

The primary sign of evident knowledge requires that the object known should strike the intellect violently, in like man-

ner as a vehement light beats upon the eye: the second sign requires that the mind should acquiesce, with great calmness and tranquility, in distinct notions, as it were abiding securely in the midst of the light. The third sign of evidence is sought from subsequent judgments, and transferred to our notions or ideas: for clear and distinct notions will lay the understanding under the necessity of judging, and certain and undoubted judgments follow distinct and clear ideas. The fourth and last sign of evidence is when the common and universal consent of mankind universally agree upon one particular point, it follows that the idea obtained concerning that thing is a clear and distinct one.

Evidence must therefore be allowed the mark of truth; and these things must be allowed true, which carry with them such a degree of evidence as obliges us to assent to them. Whatever we see evidently agreeable to things whereof we speak, that we must acknowledge to be true.

**EVIDENCE**, in law, any proof, whether it be by testimony of men on oath, or by writings and records so called, because hereby the point in issue is made evident to the jury.

As to evidence, the common law requires no certain number of witnesses, though in some cases the statute-law does. The testimony of one single evidence is sufficient for the crown in all causes, except treason, where there must be two: sometimes violent presumption will be admitted as evidence, without witnesses, as where a person is run thro' the body in a house, and one is seen to come out of that house with a bloody sword. In general, a party interested in a suit, a wife for or against her husband, unless in cases of treason, an alien infidel, persons *non sane memoria*, such as are convicted of felony, perjury, &c. may not be evidence in the cause: but kinsmen, though never so near, also tenants, servants, masters, attorneys for their clients, one of the jurors upon trial, and all others that are not infamous, and who want not understanding, or are no parties in interest, may be allowed to give evidence; tho' the credit of servants is left to the jury.

In cases of crimes, as of robbery on the highway, in an action against the hundred, and rapes of women, &c. a man or woman may be an evidence in their

own cause; so likewise in private notorious cheats, where none else can be witness of the circumstances of the fact, but he that suffers. When any person is served with a process, and refuses to appear to give evidence in a criminal cause, the court may put off the trial, and grant an attachment against him; whereupon he shall be committed to prison and fined; and in a civil cause an evidence refusing to appear on being tendered his reasonable charges, and he having no lawful excuse, action of the case lies against him, and thereupon 10 l. damages shall be recovered, and other recompence to the party.

Evidence by writings and records is where acts of parliaments, statutes, judgments, fines and recoveries, proceedings of court, and deeds, &c. are admitted as evidence. And here it is to be observed, that the printed statute-book is good evidence upon a general act of parliament, which need not be pleaded; but in the case of a private act, it is otherwise: for there it must be pleaded and examined by the records of parliament, before it can be admitted in evidence. Records and enrolments prove themselves, and a copy of a record sworn to may be given as an evidence. A record of an inferior court has been rejected in evidence, and the proceedings in county-courts, courts-baron, &c. may be denied, and then tried by a jury. A copy of copyhold-lands shall be an evidence where the rolls are lost. An antient deed proves itself: the counterpart of a deed is no evidence, when the original is in being, and can be procured.

Although a witness swear to the hand and contents of a letter, if he never saw the party write, it will not be good evidence. And a shop-book may not be given in evidence for goods sold, &c. after one year, before the action brought, except there be a bill, &c. for the debt: but this does not extend to any buying or selling, or trading between one tradesman and another: here to make books evidences, there must be the hand of the person to whom who delivered the goods, which is to be proved. In debt, a release may be given in evidence, so may any matters of fact, tampering with witnesses, or fraud.

**EVIL**, *malum*, in philosophy, &c. is either moral or natural.

Moral evil is the disagreement between the actions of a moral agent, and the

rule of those actions, whatever it be. See the articles **ETHICS** and **GOOD**. Moral good and evil coincide with right and wrong, since that cannot be good which is wrong, nor that evil which is right. See **RIGHT** and **WRONG**.

Some make the essence of moral evil consist in the disagreement of our manners to the divine will, whether known by reason or revelation; others, in being contrary to reason and truth; and others, in being inconsistent with the nature, faculties, affections, and situation of mankind. See the article **ETHICS**.

Be this as it will, no act can be deemed morally evil, unless the agent be capable of distinguishing, choosing, and acting for himself; or, more briefly, is an intelligent and free agent. See the articles **AGENT** and **ACTION**.

**Natural EVIL**, whatever destroys, or any way disturbs the perfection of natural beings: such are blindness, diseases, death, &c. See the articles **BLINDNESS**, **DISEASE**, **DEATH**, &c.

**King's EVIL**, in medicine, the same with the scrophula. See **SCROPHULA**.

**Hungry EVIL**. See **BULIMY**.

**EULOGY**, in church history, a name by which the Greeks call the *panis benedictus*, or bread over which a blessing is pronounced, and which is distributed to those who are unqualified to communicate. The name Eulogiæ was antiently given to the consecrated pieces of bread, which the bishops and priests sent to each other, for the keeping up a friendly correspondence: those presents likewise which were made out of respect or obligation, were called eulogiæ.

St. Paulinus, bishop of Nola, about the end of the sixth century, having sent five eulogiæ, at one time, to Romanian, says, "I send you five pieces of bread, the ammunition of the warfare of Jesus Christ, under whose standard we fight."

**EUMENIDES**, furies, in antiquity. See the article **FURIES**.

**EUNOMIANS**, in church history, christian heretics, in the fourth century. They were a branch of Arians, and took their name from Eunomius, bishop of Cyzicus, who was instructed by Aëtius, in the points which were then controverted in the church, after having at first followed the profession of arians. Eunomius so well answered the designs of his master, and declaimed so vehemently against the divinity of the word, that

the people had recourse to the authority of the prince, and had him banished; but the Arians obtained his recall, and elected him bishop of Cyzicus. The manners and doctrines of the Eunomians were the same with those of the Arians.

**EUNUCH**, *εὐνοχ*, a castrated person. See the article **CASTRATION**.

In Britain, France, &c. Eunuchs are never made, but upon occasion of some disease, which renders such an operation necessary: but in Italy, they make great numbers of children, from one to three years of age, eunuchs, every year, to supply the opera's and theatres of all Europe with singers: though it is not one in three, that, after having lost their virility, has a good voice for a recompence. In the eastern parts of the world, they make eunuchs in order to be guards or attendants on their women. The seraglio of the eastern emperors are chiefly served and guarded by eunuchs; and yet, from good authority, we learn, that the rich eunuchs in Persia and other countries keep seraglio's for their own use. Those who, out of an imprudent zeal to guard themselves from sensual pleasures, made themselves eunuchs, were, by the council of Nice, condemned and excluded from holy orders. There are several severe prohibitions in Germany against the making of eunuchs; and in France an eunuch must not marry, not even with the consent of the woman.

**EUNUCHS**, in church history, a sect of heretics, in the third century, who were mad enough to castrate, not only those of their own persuasion, but even all others that they could lay hold of: they took their rise from the example of Origen, who, misunderstanding the following words of our Saviour, --- "And eunuchs who made themselves eunuchs for the kingdom of heaven," castrated himself.

**EVOCATION**, *EVOCATIO*, in roman antiquity, a solemn invitation preferred by way of prayer, to the gods and goddesses of a besieged town, to forsake it and come over to the Romans; who always took it for granted that their prayers were heard, provided they could make themselves masters of the place.

**EVOLUTE**, *EVOLUTA*, in the higher geometry, a curve, which, by being gradually opened, describes another curve. Such is the curve BCF; (plate

XCIV. fig. 4.) for if a thread FCM be wrapped about, or applied to, the said curve, and then unwound again, the point M thereof will describe another curve A M M, called by Mr. Huygens, a curve described from evolution. The part of the thread, MC, is called the radius of the evolute, or of the osculatory circle described on the center C with the radius M C.

Hence, 1. when the point B falls in A, the radius of the evolute MC is equal to the arch BC; but if not, to AB and the arch BC. 2. The radius of the evolute CM is perpendicular to the curve AM.

3. Because the radius MC of the evolute continually touches it, it is evident from its generation, that it may be described through innumerable points, if the tangents in the parts of the evolute are produced until they become equal to their corresponding arches. 4. The evolute of the common parabola is a parabola of the second kind, whose parameter is  $\frac{27}{16}$ , of the common one. 5.

The evolute of a cycloid is another cycloid equal and similar to it. 6. All the arches of evolute curves are rectifiable, if the radii of the evolute can be expressed geometrically. Those who desire a more particular account of these curves, may consult Huygens's *Horologium Oscillatorium*, Sir Isaac Newton's and Mac-Laurin's *Fluxions*, and Wolfius.

**EVOLUTION**, in algebra, the extraction of roots. See the article **EXTRACTION**.

**EVOLUTION**, in the art of war, the motion made by a body of troops, when they are obliged to change their form and disposition, in order to preserve a post, or occupy another, to attack an enemy with more advantage, or to be in a condition of defending themselves the better.

It consists in doublings, counter-marches, conversions, &c. A battalion doubles the ranks, when attacked in front or rear, to prevent its being flanked, or surrounded; for then a battalion fights with a larger front. The files are doubled either to accommodate themselves to the necessity of a narrow ground, or to resist an enemy which attacks them in flank; but if the ground will allow it, conversion is much preferable, because after conversion the battalion is in its first form, and opposes the file-leaders, which are generally the best men to the enemy; and likewise, because doubling

the files in a new, or not well disciplined regiment, they may happen to fall into disorder. See **DOUBLING**.

**EUONYMOIDES**, in botany, a name used by some for the *celastrus*. See the article **CELASTRUS**.

**ENONYMUS**, the **SPINDLE-TREE**, in botany, a genus of the *tetrandria monogynia* class of plants, the corolla whereof consists of four ovated, plane, and patent petals, longer than the cup: the fruit is a succulent, coloured capsule, of a quadragonal figure, formed of four valves, terminating in four points, and forming four cells: the seeds are single, of an oval figure, and covered with a calyptra. See plate XCIV. fig. 5.

The fruit of this plant provokes vomiting, is a stomachic, and purges by stool: however, it is dangerous, and should be taken cautiously.

**EVORA**, or **EBORA**, a city of Portugal, seventy miles south-east of Lisbon. It is an archbishopric and university, and is situated in one of the pleasantest and most fruitful countries of that kingdom. See the article **PORTUGAL**.

**EUPATORIOPHALACRON**, in botany, the same with the *verbescina*. See the article **VERBESINA**.

**EUPATORIUM**, **HEMP-AGRIMONY**, in botany, a genus of the *syngenesia-polygamia equalis* class of plants, the compound corolla of which is uniform and tubulose; the hermaphrodite flowers are equal; the partial flower is infundibuliform: the fruit is naked, only covered by the cup: the seeds are oblong, and crowned with a plumose down.

This plant is hepatic and vulnerary; but the principal use of it is in cachexies, catarrhs, and in suppressions of urine and the menses: the root purges just in manner of the white hellebore.

**EUPHEMIA**, a port-town of the further Calabria, in Naples, fifty miles north-east of Reggio.

**EUPHEMISM**, *εὐφημισμός*, in rhetoric, a figure which expresses things in themselves disagreeable and shocking, in terms implying the contrary quality: thus, the Pontus, or black Sea, having the epithet *αἰετός*, i. e. inhospitable, given it, by reason of the savage cruelty of those who inhabited the neighbouring countries, this name, by Euphemism, was changed into that of Euxinus. Thus *Ovid Trist. lib. iii. el. 13.*

*Dum me terrarum pars penè novissima  
Ponti*

*Euxinus falso nomine dictus habet.*

And again, in *Trist. lib. v. el. 10.*

*Quem tenet Euxini mendax cognomine litus.*

In which significations, nobody will deny its being a species of irony: but every euphemism is not irony, for we sometimes use improper and soft terms in the same sense with the proper and harsh.

**EUPHONY**, *ευφωνια*, in grammar, an easiness, smoothness, and elegance in pronunciation.

Euphony is properly a figure, whereby we suppress a letter that is too harsh, and convert it into a smoother, contrary to the ordinary rules: of this there are abundance of examples in all languages.

**EUPHORBIA**, in botany, a genus of the *polyandria-monogynia* class of plants, comprehending the tithymalus or spurge, the euphorbium properly so called, the tithymaloides, and the esula of authors. The flower consists of four or five petals, which are thick, gibbous, turbinate and truncated: the fruit is a roundish trilocular capsule, containing a single roundish seed.

The euphorbium has a fleshy or angular stalk, and the petals in some species are trifid; the tithymalus has leaves on the stalk, which the others have not; and the tithymaloides has the calyx gibbous on the under side. See the article **EUPHORBIIUM**, &c.

**EUPHORBIIUM**, in pharmacy, a gum resin brought us always in loose, smooth, and glossy gold-coloured drops or granules. It is the produce of the euphorbium antiquorum verum, which grows to ten or twelve feet high. Its principal use is externally in sinapisms, and plasters applied to the feet, which are intended to stimulate, but not absolutely to raise blisters: for it is observed by Avicenna, that when taken internally in large doses, it has been found to exulcerate the intestines, and bring on death itself, after the most terrible symptoms.

**EUPHRASIA**, **EYE-BRIGHT**, in botany, a genus of the *didynamia-angiospermia* class of plants, the corolla of which consists of a single ringent petal; the tube is of the length of the cup; the upper lip is concave and emarginated; the lower one is patent, and divided into three segments: the fruit is an ovato-oblong, compressed capsule, forming two

cells: the seeds are numerous, very small, and of a roundish figure.

This plant is an ophthalmic and cephalic, and good for a weak memory.

**EUPHRATES**, the finest river in Turkey in Asia, has two sources, northward of the city of Erzerum, in 40° north latitude. After passing through Armenia, it divides Syria from Diarbeck or Assyria, runs through Eyraca or Chaldea; and uniting with the Tigris, it passes by the city of Bassora, fifty miles below which it falls into the gulph of Persia.

**EUPHROSYNUM**, in botany, a name used by the antients for borrague.

**EUREUX**, a city of Normandy in France, twenty-five miles south of Rouen.

**EURIPUS**, a strait between the island of Negropont, and the continent of Greece, remarkable for its irregular tides.

The term euripus is sometimes used, in a more general sense, for any straits, where the water is much agitated.

**EUROPE**, the least of the four grand divisions of the earth, is situated between 36° and 72° north latitude; and between 10° degrees west longitude, and 65° east longitude; being about 3000 miles long from north to south, and 2500 miles broad from east to west. It is bounded by the frozen ocean on the north, by Asia on the east, by the Mediterranean, which separates it from Africa, on the south, and by the Atlantic ocean on the west.

Europe is commonly subdivided into three grand divisions, north, middle, and south. The north or upper division comprehends Russia or Muscovy, Sweden, Denmark, and Norway, and the islands of Britain, Iceland, Greenland, and those of the Baltic. The middle division contains Poland, Germany, and the hereditary dominions of the house of Austria, the Low Countries, or Netherlands, and France. The southern division comprehends Turkey in Europe, the antient Greece chiefly, Switzerland, Italy, Spain and Portugal, and the islands of Sicily, Sardinia, Corsica, Majorca, Minorca, Ivica, and those of the Archipelago. See the articles **RUSSIA**, **SWEDEN**, **DENMARK**, &c.

**EURYTHMY**, in architecture, painting, and sculpture, is a certain majesty, elegance, and easiness, appearing in the composition of divers members, or parts of



of a body, painting or sculpture, and resulting from the fine proportion of it. Vitruvius ranks the eurythmia among the essential parts of architecture: he describes it as consisting in the beauty of the construction, or assemblage of the several parts of the work, which renders its aspect, or its whole appearance, grateful; *e. g.* when the height corresponds to the breadth, and the breadth to the length. Evelyn, in his account of architecture, says, that from these three ideas, or designs, *viz.* orthography, scenography, and profile, it is, that the same eurythmia, majestic and beautiful appearance of an edifice does result, which creates that agreeable harmony between the several dimensions, *i. e.* between the length, breadth, and height of each room in a fabric, so that nothing seems disproportional, too long for this, or too broad for that, but corresponds in a just and regular symmetry and consent of all the parts with the whole.

**EUSEBIANS**, a name given to the arians. See the article **ARIANS**.

**EUSTATHIANS**, the same with the catholics of Antioch, in the IVth century, so called from their refusing to acknowledge any other bishop beside St. Eustathius, who was deposed by the arians.

**EUSTACE**, or **EUSTATIA**, one of the Caribbee-islands, four miles west of St. Christopher's, and subject to the Dutch.

**EUSTYLE**, in architecture, a sort of building in which the pillars are placed at the most convenient distance one from another, the intercolumniations being just two diameters and a quarter of the column, except those in the middle of the face, before and behind, which are three diameters distant.

**EUTYCHIANS**, in church-history, heretics in the Vth century, who embraced the errors of the monk Eutyches, maintaining that there was only one nature in Jesus Christ. The divine nature, according to them, had so entirely swallowed up the human, that the latter could not be distinguished; inasmuch, that Jesus Christ was merely God, and had nothing of humanity but the appearance. This heresy was condemned in a council held at Constantinople in 448, which sentence was confirmed by the general council of Chalcedon, in 451.

**EUXINE**, the same with the Black-sea. See the article **BLACK-SEA**.

**EWAGE**, a toll paid for the passage of water, and otherwise called aquage.

**EWEE**, the english name of a female sheep.

See the articles **OVIS** and **SHEEP**.

**EWRY**, in the british customs, an office in the king's household, which has the care of the table-linnen, of laying the cloth, and serving up water, in silver ewers, after dinner.

**EXACERBATION**, the same with **PAROXYSM**. See the article **PAROXYSM**.

**EXACHORD**, or **HEXACHORD**. See the article **HEXACHORD**.

**EXACTION**, in law, a wrong done by an officer, or a person in pretended authority, in taking a reward or fee, that is not allowed by law.

A person guilty of exaction may be fined and imprisoned. It is often confounded with extortion. See **EXTORTION**.

**EXACTIS**, in zoology, a species of starfish, with six rays. See **STAR-FISH**.

**EXACTOR REGIS**, is sometimes taken for the sheriff, though more generally it denotes any person that collects the public monies, &c.

**EXACUM**, in botany, a genus of the *terandria-monogynia* class of plants: the flower is monopetalous, patent, and divided into four segments at the limb; the fruit is a bilocular capsule, marked with two deep furrows, opening at the top, and containing numerous seeds.

**EXAGON**, or **HEXAGON**. See the article **HEXAGON**.

**EXÆRESIS**, in surgery, the operation of extracting or taking away something that is hurtful to the human body.

**EXAGGERATION**, in rhetoric, a kind of hyperbole, whereby things are augmented or amplified, by saying more than the truth, either as to good or bad.

There are two kinds of exaggeration, the one of things, the other of words. The first is produced, 1. By a multitude of definitions. 2. By a multitude of adjuncts. 3. By a detail of causes and effects. 4. By an enumeration of consequences. 5. By comparisons. And, 6. By the contrast of epithets and rational inference.

Exaggeration by words is effected, 1. By using metaphors. 2. By hyperboles. 3. By synonymous terms. 4. By a collection of splendid and magnificent expressions. 5. By periphrasis. 6. By repetition. And, lastly, by confirmation with an oath; as for example, *Parietes, medius fidius, gratias tibi agere gestiunt*. See **METAPHOR** and **HYPERBOLE**.

**EXAGGERATION**, in painting, a method by which the artist, in representing things, charges

charges them too much, or makes them too strong, either in respect of the design or the colouring. It differs from caricaturing, in that the latter perverts or gives a turn to the features of a face, &c. which they had not; whereas exaggeration only heightens or improves what they had.

**EXALTATION**, elevation, in a figurative sense, is applied to denote the inauguration, coronation, &c. of the pope. See the articles **INAUGURATION**, &c.

**EXALTATION of the cross**, in church-history. See the article **CROSS**.

**EXALTATION**, in astrology, is a dignity which a planet acquires in certain signs or parts of the zodiac, which dignity is supposed to give it an extraordinary efficacy and influence. Thus the 15° of cancer is the exaltation of jupiter, according to Albumazar; that of the sun is the 19° of aries, and that of the moon is in taurus.

**EXALTATION**, in chemistry, signifies an operation by which a substance has its properties changed, and raised to a higher degree of dignity and virtue.

There are two kinds of exaltation: 1. Maturation, which is nothing but the raising and promoting a thing from a crude to a mature and perfect state. And, 2. Gradation. See **MATURATION** and **GRADATION**.

**EXAMINATION**, an exact and scrupulous disquisition or enquiry, in order to find out the truth of any thing.

**Self-EXAMINATION**, by way of preparation to repentance, is reduced by divines to five points: 1. A returning thanks to God for his benefits. 2. A begging of grace and light, to know and distinguish our sins. 3. An enquiry into all our words, thoughts, and actions, in order to learn what has been offensive to God. 4. A begging of pardon, and conceiving a sincere sorrow for having displeased him. 5. Making a firm resolution not to offend him any more; and taking the necessary precautions to preserve ourselves from it.

**EXAMILION**, or **HEXAMILION**. See the article **HEXAMILION**.

**EXAMINERS**, in chancery, two officers of that court, who examine, upon oath, witnesses produced in causes depending there, by either the complainant or defendant, where the witnesses live in London, or near it. Sometimes parties themselves, by particular order, are examined. In the country, above twenty miles from London, on the parties joining in commission, witnesses are examined by

commissioners, being usually counsellors or attornies, not concerned in the cause. See the article **CHANCERY**.

**EXAMPLE**, in rhetoric, is a way of reasoning, by which a particular fact is produced, or cleared up, by another that is similar to it.

**EXANNUAL ROLL**, that wherein, according to the old way of exhibiting sheriffs accounts, the illeivable fines and desperate debts were transcribed.

This roll was yearly read over to the sheriffs, to see what might be gotten thereby.

**EXANTHEMA**, *εξανθημα*, among physicians, denotes any kind of efflorescence or eruption, as the measles, purple spots in the plague, or malignant fevers, &c.

**EXARCH**, *εξαρχος*, in antiquity, an officer sent by the emperors of the east, into Italy, in quality of vicar, or rather præfect, to defend that part of Italy which was yet under their obedience, and particularly the city of Ravenna, against the Lombards. The exarch resided at Ravenna, which place, with Rome, was all that was left to the emperors, of their italian dominions. The first exarch was under Justin the younger, in the year 567, after Belisarius and Narfes had driven the barbarians out of Italy. The last was Euty chius, defeated by Adolphus king of the Lombards, in 752. But Pepin, king of France, deprived him of the exarchate, and made a gift of it to the pope, ordering his chaplain to lay the keys of all the towns on the altar of St. Peter and Paul at Rome.

**EXARCH of a diocese** was the same with primate. See the article **PRIMATE**.

**EXARCH** also denotes an officer still subsisting in the greek church, being a kind of visitor, or one deputed by the patriarch into provinces, to see whether the bishops do their duty, and whether the rest of the clergy observe the canons of the church. There is another officer also of this name under the patriarchs of the greek church, who has the care and inspection of the patriarchal monasteries, or such as depend immediately on the patriarch.

**EXARCHOS** is a name given by Homer, Philo, and other ancient writers, for the choragus, or he who sung first in the ancient chorus. See the articles **CHORAGUS** and **CHORUS**.

**EXARTICULATION**, in surgery. See the article **LUXATION**.

**EXAUCTIONATION**, *exauktionatio*, in roman antiquity, corresponded, in some measure,

measure, to our keeping soldiers or sailors in half-pay; but differed in this, that the *exauctorati milites* were deprived of their pay and arms, without being absolutely discharged. Sometimes, indeed, it signifies a full, but ignominious discharge.

**EXCALCEATION**, among the Hebrews, was a particular law, whereby a widow, whom her husband's brother refused to marry, had a right to summon him to a court of justice, and, upon his refusal, might excalceate him, that is, pull off one of his shoes, and spit in his face; both of them actions of great ignominy.

**EXCAMBIATORS**, in our old customs, persons employed in exchanging lands, much the same as our brokers are between merchants. See the article **BROKER**.

**EXCELLENCY**, a title antiently given to kings and emperors, but now to ambassadors, and other persons, who are not qualified for that of *highness*, and yet are to be elevated above the other inferior dignities.

In England and France the title is now peculiar to ambassadors, but very common in Germany and Italy. Those it was first appropriated to, were the princes of the blood of the several royal houses; but they quitted it for that of *highness*, upon several great lords assuming excellency. The ambassadors have only bore it since the year 1593, when the pope complimented the duke de Nevers, ambassador from Henry IV. of France, with the title of excellency; and though it was on account of his birth, and not of his character, yet the ambassadors of all nations have ever since claimed the same appellation.

The ambassadors of Venice have only had the title of excellency since the year 1636, when the emperor and king of Spain consented to allow it to them. The court of Rome never allows that title to any ambassador who is a churchman, as judging it a secular title.

The ambassadors of France, at Rome, antiently gave the title of excellency to all the relations of the pope then reigning, and to several other noblemen; but now they are more reserved in that respect; though they still treat all the roman princes with excellency: on the other hand, the court of Rome bestows the same title on the chancellor, ministers, and secretaries of state, and presidents of the sovereign courts of France, the presi-

dents of the councils in Spain, and the chancellor of Poland, if they are not ecclesiastics. *Dist. Trevoux*.

**EXCELSIS**, or *Gloria in EXCELSIS*. See the article **GLORIA**.

**EXCENTRIC**, in geometry, a term applied to circles and spheres which have not the same center, and consequently are not parallel; in opposition to concentric, where they are parallel, having one common center.

**EXCENTRIC circle**, in the ptolemaic system, the very orbit of the planet itself, which it was supposed to describe about the earth. It was also called the deferent. See the article **DEFERENT**.

**EXCENTRIC circle**, in the new astronomy, a circle described from the center of the orbit of the planet, with half the axis as a radius.

**EXCENTRIC equation**, in the old astronomy, is an angle made by a line drawn from the center of the earth, and another drawn from the center of the excentric to the body or place of any planet, the same with the prosthaphæresis; and is equal to the difference (accounted in an arch of the ecliptic) between the sun's or planet's real and apparent place.

**EXCENTRIC place of a planet**, is the very point of the orbit, where the circle of inclination coming from the place of a planet in its orbit, falls thereon with right angles.

*Anomaly of the EXCENTRIC*. See the article **ANOMALY**.

**EXCENTRICITY**, in the old astronomy, is the distance of the center of the orbit of a planet from the center of the earth. It is generally allowed that saturn, jupiter, mars, venus, and mercury, have such an excentricity, because they appear to us of different magnitudes at different times, which could only proceed from hence that their orbits being excentric to the earth, in some parts thereof they are nearer us, and in others more remote. But some dispute has been made about the excentricities of the sun and moon. Many people maintain that the sun and moon appear sometimes larger, and sometimes less; not that they are nearer us at one time than at another, but because they are viewed through different columns of air, which producing a difference in the refraction of their light, may occasion those different appearances. Others again take the excentricities of the sun and moon to be sufficiently proved, both from eclipses, from the moon's greater and less  
parallax

parallax at the same distance from the zenith, and from the sun's being observed to continue longer in the northern than in the southern hemisphere.

**EXCENTRICITY**, in the new astronomy, is the distance of the center of the orbit of a planet from the center of the sun, that is, the distance between the center of the ellipsis and the focus thereof. It is also called single or single excentricity.

*To find the EXCENTRICITY of the earth's orbit, and the place of the apfides.* Take an observation of mars when he is in opposition with the sun, and then, if mars be in M (plate XCIV. fig. 3.) the sun in S, and the earth in T, they will be all in the same right line MTS. When mars, after 687 days, returns again to the same point M, and the earth not reaching the same till after  $730\frac{1}{2}$  days, in which time he completes two revolutions in her orbit, is found in the point A, observe the place of the sun seen from the earth by the right line AS, and the place of mars seen by the right line AM. We have, therefore, by means of the sun's place in E, at the time of the second observation, and his place in F, at the time of the first observation, the angle ESF given, to which the angle MSA is equal. And by knowing the place of the sun and mars in the second observation, we have the distance of mars from the sun, or the angle MAS. In the same manner may be found the angle MSB, and BS the distance of the earth from the sun in decimal parts of MS, when mars returns a second time to M, and likewise the angle MSC, and the right line SC, when mars returns a third time to M. Wherefore since the focus of the earth's orbit is in S, and A, B, and C are points in that orbit, the line of the apfides will be determined, the orbit will be described, and consequently the excentricity will be known. The excentricity of all the primary planets, and the position of the line of apfides may be found in the same manner, if three heliocentric places of the planet, together with its true distance from the sun are known. But it must be observed, that we suppose that the planet, in the same point of its orbit, has the same distance from the sun, which we may easily suppose on account of the slowness of the motion of the aphelia.

The excentricities of the several orbits of the planets are as follow; supposing

the distance of the earth from the sun, 1000 equal parts:

The excentricity of mercury's orbit is about	80	} of such parts.
Venus's	5	
The earth's	17	
Mars's	141	
Jupiter's	250	
Saturn's	247	

The excentricity of the moon's orbit is about  $3,3$  of the semi-diameter of the earth, and now and then it grows greater and now and then it diminishes. It is greatest when the line of the apfides is coincident with the syzygia, or is in the line which joins the centers of the sun and earth. And the excentricity is least when the line of the apfides cuts the other at right angles. The difference between the greatest and least excentricity is so considerable, that it exceeds the half of the least excentricity.

**Double EXCENTRICITY**, is the distance between the two foci in the ellipsis, which is equal to twice the single excentricity.

**EXCEPTION**, in law, denotes a stop or stay to an action, and is either dilatory or peremptory, in proceedings at common law: but in chancery it is what the plaintiff alledges against the sufficiency of an answer, &c.

An exception is no more than the denial of what is taken to be good by the other party, either in point of law, or pleading. The counsel in a cause are to take all their exceptions to the record at one time, and before the court has delivered any opinion of it.

**EXCEPTION to evidence**, is where a demurrer is offered in any civil cause, for the insufficiency of the evidence given, and the court does not agree to it; in such case, the court, upon request, is to seal a bill of exceptions to the evidence, which may be heard on a writ of error. A plaintiff or defendant may also alledge any exception to the judge's opinion, praying the same to be allowed; and if the judge refuses it, then the party concerned is to write it down, and, when signed by counsel, require the judge to seal the same, to be heard afterwards.

**EXCEPTIONS in deeds and writings**, is the saving a particular thing out of a general one granted by deed, as a room, shop, or cellar out of a house; a field, or timber trees, out of land, &c.

Exceptions of this kind must be something serviceable, and if they cross the grant, or are repugnant thereto, they are void

of course. Yet there may be a kind of exception, or saving out of an exception, so as to make a thing as if never excepted; as where a lease is made of a rectory, excepting the parsonage-house, saving to the lessee a chamber, this shall pass by the lease.

**EXCEPTIVE**, something that contains exceptions; such are exceptive propositions. See the article **PROPOSITION**.

**EXCERPTA**, in matters of literature. See the article **EXTRACT**.

**EXCESS**, in arithmetic and geometry, is the difference between any two unequal numbers or quantities, or that which is left after the lesser is taken from or out of the greater. See **SUBTRACTION**.

**EXCHANGE**, in a general sense, a contract, or agreement, whereby one thing is given or exchanged for another. See the article **BARTERING**.

**EXCHANGE**, in commerce, implies the trade of money, carried on between one place and another, by means of bills of exchange. See the article **BILL**.

The original traffic of mankind becoming troublesome, necessity led them to the invention of some more easy manner of continuing their commerce, for which end money was thought the most commodious medium, and consequently this was, many ages since, adopted to carry on their trade; and still, for a greater convenience of foreign trade, they not only made coins of the most valuable metals, but, by degrees, fell into an improvement even of this, and substituted remittances and exchange, by bills, to save the expence and risque which the portage of money from one kingdom to another occasioned.

But as commerce varied, so did exchange too, though long ago they were generally reduced in Europe into four, *viz.* cambio commune, cambio real, cambio sicco, and cambio fictitio.

Cambio commune, in England, was that which was constituted by the several kings, who, having received monies in England, would remit the like sum by exchange, to be paid in another kingdom, according to the value of the different coins current in these countries. Cambio real was when monies were paid to the exchanger, and bills were drawn without naming the species, but according to the value of the several coins; and was no more than the payment of money in England, with a proviso to be paid the just value in specie, in another country, ac-

cording to the price agreed on between the exchanger and deliverer, to allow or pay for the exchange of the money and the loss of time. Cambio sicco, or dry exchange, is when a merchant has occasion for 500*l.* for a certain time, and would pay interest for it; but the lender, being desirous to take more than the statute allows, and yet willing to avoid its penalty, offers the 500*l.* by exchange for Cadiz, to which the merchant agrees; but having no correspondent there, the lender desires him to draw his bill on the said place, payable at double or triple usance, by any feigned person, as the exchange shall then govern, with which the merchant complies; and on receipt of the bill, the banker pays the money and remits the bill to some friend at Cadiz, which, with the exchange and interest, the merchant is to pay his creditor: these expences formerly were very considerable. Cambio fictitio is when a merchant hath occasion for goods, but cannot spare money for their payment; and the owner of them, to secure his advantage, and avoid the penalty of the law, acts as the surer in the former case, and obliges the buyer to defray the expences of re-exchange, &c.

The just and true exchange for monies, that is at this day used both in England and other countries, by bills, is *par pro passu*, or value for value. Thus the english exchange is grounded on the weight and fineness of our own money, and the weight and fineness of those of each other country, according to their several standards, and proportionable to their valuations, which, being truly and justly made, ascertains and reduces the price of exchange to a sum certain for the exchange of monies to any country whatever. As money is the common measure of things between man and man within the realm, so is exchange between merchant and merchant both within and without the realm; the which is properly made by bills, when money is delivered simply here in England, and bills received for the repayment of the same in some other country, either within or without the realm, at a price certain, agreed on between the merchant and the deliverer; for there is not at this day any peculiar or proper money to be found in specie, whereon outland exchanges can be grounded; therefore, all foreign coins are called imaginary.

As the monies and species of almost every nation differ not only in their current prices, but also in their intrinsic value, there is a just and certain par established between them, according to the real and effective worth of each species, without any regard to their currency in the countries where they are coined; and the par is, by some authors, supposed to be of two sorts, *viz.* the one of real monies, the other of exchanges, or imaginary species, though both seem to be the same thing, as having a necessary dependance on each other. See the article PAR.

The relative abundance and scarcity of specie in different countries, form what is called the course of exchange. This scarcity or plenty, from whence results the mutability of the course of exchange, is not the real, but a relative scarcity or plenty; for example, when France has greater occasion for funds in Holland, than the Dutch of having funds in France, specie is said to be common in France, and scarce in Holland; and *vice versa*. See BALANCE of trade.

In order to judge of the scarcity or plenty of specie, we must know, for example, that if there are more bills from Holland than there are from France, then specie is scarce in France, and common in Holland: it then becomes necessary that the exchange should rise, and the Dutch give more for specie of the same value in France, than the French for that of an equivalent value in Holland. When money of the same standard and weight in France, yields money of the same standard and weight in Holland, it is said that the exchange is at par. In the actual state of specie, which was in 1741, the par was nearly at 54 gros to the french crown of three livres. When the exchange is above 54 gros, the French say it is high; when beneath, they say it is low.

In order to know the loss and gain of a state in a particular situation of exchange, it must be considered as debtor and creditor, as buyer and seller. When the exchange is below par, it loses as debtor, and gains as creditor; it loses as buyer, and gains as seller. It is obvious it loses as debtor. Suppose, for example, France owes Holland a certain number of gros, the greater number of gros there are in a crown, the more crowns she has to pay. On the contrary, if France is creditor for a certain number of gros, the less number of gros there are in a crown, the more crowns she will receive. The state loses also as a buyer;

for there must be the same number of gros to buy the same quantity of merchandise; and while the exchange is low, every french crown is worth fewer gros: for the same reason, the state gains as seller: you sell your merchandise in Holland for a certain number of gros: you receive then more french crowns, when for every 50 gros you receive a crown, than you would do if you received the same crown for every 54. The contrary to this takes place in the other state. If the Dutch are indebted a certain number of crowns to France, they will gain; if they are owing to them, they will lose; if they sell, they lose; if they buy, they gain.

Again, when the exchange between France and Holland is below par; for example, if it should be at 50 instead of 54, it should follow, that France, on sending bills of exchange to Holland for 54,000, could buy merchandises only to the value of 50,000; and that, on the other hand, the Dutch sending the value of 50,000 to France, might buy 50,000 crowns, which makes a difference of  $\frac{8}{3}$ , that is, a loss of more than  $\frac{1}{7}$ ; so that France would be obliged to send to Holland  $\frac{1}{7}$  more in specie or merchandise, than she would do was the exchange at par; and as the mischief must consequently increase, because a debt of this kind would bring the exchange still lower, France would in the end be ruined.

It seems, we say, as if this should certainly follow; and yet it does not, because states constantly lean towards a ballance, in order to preserve their independency. Thus they borrow only in proportion to their ability to pay, and measure their buying by what they sell; and taking the example from what has been said, if the exchange happens to fall in France from 54 to 50, the Dutch, who buy merchandises in France to the value of a thousand crowns, for which they used to pay 54,000 gros, would now only pay 50,000, if the French would consent to it. But the merchandise of France will rise insensibly, and the profit will be shared between the French and the Dutch; for when a merchant can gain, he easily shares his profit: there then arises a communication of profit between the French and the Dutch.

In the same manner, the French who bought merchandises of Holland for 54,000 gros, and who, when the exchange was at 54, paid for them 1000 crowns,

crowns, will be obliged to add  $\frac{3}{4}$  more in french crowns, to buy the same merchandises. But the french merchant, being sensible of the loss he suffers, will take up less of the merchandise of Holland: the french and the dutch merchant will then be both losers, the state will insensibly fall into a ballance, and the lowering of the exchange will not be attended with these inconveniencies we had reason to fear.

A merchant may send his stock into a foreign country, when the exchange is below par, without injuring his fortune, because when it returns, he recovers what he had lost; but a prince, who sends only specie into a foreign country, which can never return, is always a loser.

When the merchants have great dealings in any country, the exchange there infallibly rises. This proceeds from their entering into many engagements, buying great quantities of merchandises, and drawing upon foreign countries to pay for them.

A prince may amass great wealth in his dominions, and yet specie may be really scarce, and relatively common: for instance, a state is indebted for many merchandises to a foreign country, the exchange will be low, though specie be scarce.

The exchange of all places constantly tends to a certain proportion, and that in the very nature of things. If the course of exchange from Ireland to England is below par, that of Ireland to Holland will be still lower: that is, in a compound ratio of that of Ireland to England, and that of England to Holland: for a dutch merchant, who can have his specie indirectly from Ireland, by the way of England, will not choose to pay dearer, by having it the direct way.

This, we say, ought naturally to be the case; but, however, it is not exactly so: there are always circumstances which vary these things; and the different profit of drawing by one place, or of drawing by another, constitutes the particular art and dexterity of the foreign bankers. See the article **BANKER**.

This is what in a great measure constitutes what is called arbitration in exchanges, which is defined to be a truck, which two bankers mutually make of their bills upon different parts, at a conditional price, and course of exchange. This is the most beneficial, as well as the

most delicate branch of exchange to be thoroughly informed of.

1. Before any one applies himself to the study of this subject, it is necessary that he should be well skilled in the practical operations, in regard to the reducing of the sterling money of England into the foreign monies of exchange and of account of all places throughout Europe, according to the direct courses of exchange established for these purposes, and *vice versa*.

2. That he should be acquainted with the methods of converting sterling money into the monies of exchange and of account of all other places of commerce, wherewith England has no direct established courses of exchange, but is under the necessity of making use of the intermediate exchanges of other places; together with the nature of the agios, and the manner of converting their bank monies into current, and the reverse. See the article **AGIO**.

3. The manner of calculating all the foreign monies of Europe into those of every other distinct country, either according to the direct or intermediate exchange, which makes a much greater variety of cases than those who are not acquainted with this extensive subject can imagine.

4. It is necessary also to know the intrinsic value of foreign monies, according to the most accurate assays which have been made for that purpose; and this the reader will find done to his hand under the article **COIN**. See **COIN**.

5. Lastly, it is requisite to understand the general natural causes of the rise and fall of the courses of exchange between nation and nation, or between one trading city and another in the same nation; which depends upon the ballance of trade being either in favour of, or against a nation, or trading city. Another method of considering the arbitration of exchanges, is founded upon comparing the various occasional prices of exchange between nation and nation, in order to discover at all times, whether certain courses continue in an equality of proportion, or how far they deviate therefrom; by which means the advantage to be made by such a comparison of exchanges may be exactly ascertained, for the government of the merchant or remitter, to take his measures accordingly, and not to let the advantageous occasion

escape his cognizance. And this must necessarily prove the case, provided a person is not accomplished in this branch of the exchanges; and here it will be proper to observe, that in a comparison or combination of the courses of exchange of several places together, it is rare that they happen to ebb and flow in an exact equality of proportion; the reason whereof must be obvious to every one who considers, that the ballance of trade differs between different nations; which being the case, the judgment of the exchange-negotiator consists in vigilantly observing, from a due comparison of the courses, where the greatest inequality of proportion lies: for there lies the greatest profit to be made, by drawing and remitting to certain places preferably to others.

But the greatest profit to be made this way, does not always happen to arise from a comparison of these courses only, where the general currency of a trader's business lies: on the contrary, from the nature and circumstances of the trade of such countries, the rise and fall of the courses may generally continue in such an equality of proportion, as only occasionally, or seldom, to admit of any extra-profit by the exchange. When the exchange is lower than the specie of a country, a profit may be made by sending it abroad; when it is higher than the specie, there is a profit in causing it to return: but there is a case in which profit may be made by sending the specie out of the kingdom, when the exchange is at par; that is, by sending it into a foreign country, to be coined over again. When it returns, an advantage may be made of it, whether it be circulated in the country, or paid for foreign bills.

**EXCHANGE** signifies also a place in most considerable trading cities, wherein the merchants, negociants, agents, bankers, brokers, interpreters, and other persons concerned in commerce, meet on certain days, and at certain times thereof, to confer and treat together of matters relating to exchanges, remittances, payments, adventures, assurances, freightments, and other mercantile negotiations, both by sea and land.

These assemblies are held with so much exactness, that the absence of a merchant, &c. makes him suspected of drawing to a failure or bankruptcy, as not being able to stand the change.

The most considerable exchanges in Eu-

rope, are those of Amsterdam, and that of London, called the royal-exchange. See the article **ROYAL-EXCHANGE**.

**EXCHANGE**, in law, signifies a mutual grant of lands or tenements, the one in exchange for the other.

This word, in our law, is peculiarly used for that compensation which the warrantor must make to the warrantee, value for value, in case the land warranted be taken, or recovered from the warrantee. Exchanges are made of lands in fee, tail, or for term of life, &c. where a person is seised of certain lands or tenements, and another is seised of other lands, &c. those two persons may exchange their lands, so that each of them shall have the other's lands so exchanged. But in this exchange the estates granted must be equal; for should one have an estate in fee in his land, and the other an estate in the other land only for term of life, or in tail, such exchange is void, on account of the inequality; though, if the estates are equal, as estate in fee for another in fee, tail for tail, &c. the exchange will be good, if the lands be not of equal value.

**EXCHANGERS**, are such as return money by bills of exchange. See the articles **BILL** and **EXCHANGE**.

**EXCHEQUER**, in the british jurisprudence, an antient court of record, in which all causes concerning the revenues and rights of the crown are heard and determined, and where the crown-revenues are received.

It took this name from the cloth that covered the table of the court, which was party-coloured or chequered.

This court is said to have been erected by William the conqueror, its model being taken from a like court established in Normandy long before that time. Antiently its authority was so great, that it was held in the king's palace, and the acts thereof were not to be examined or controlled in any other of the king's courts; but, at present, it is the last of the four courts at Westminster.

In the exchequer, some reckon seven courts, viz. those of pleas, accounts, receipts, exchequer-chamber, (which is an assembly of all the judges on difficult matters in law) errors in the exchequer, errors in the king's bench, and, lastly, the court of equity in the exchequer.

But the exchequer, for dispatch of business,



ness, is generally divided into two parts ; one of which is chiefly conversant in the judicial hearing and deciding of all causes relating to the king's coffers, formerly termed the exchequer of accounts : the other is called the receipt of the exchequer, as being principally employed in receiving and payment of money.

Officers of the receipt may take one penny in the pound, as their fee for sums issued out ; and they are obliged, without delay, to receive the money brought thither ; and the money received is to be put in chests under three different locks and keys, kept by three several officers. All sheriffs, bailiffs, &c. are to account in the exchequer ; and in the lower part, termed the receipt, the debtors of the king, and persons in debt to them, the king's tenants, and the officers and ministers of the court, are privileged to sue one another, or any stranger, and to be sued in the like actions as are brought in the courts of king's bench and common-pleas.

The judicial part of the exchequer, is a court both of law and equity. The court of law is held in the office of pleas, according to the course of common law, before the barons : in this court, the plaintiff ought to be a debtor or accountant to the king ; and the leading process is either a writ of subpoena, or quo minus, which last goes into Wales, where no process out of our courts of law ought to run, except a *capias utlagatum*.

The court of equity is held in the exchequer-chamber before the treasurer, chancellor, and barons ; but, generally, before the barons only ; the lord chief baron being the chief judge to hear and determine all causes. The proceedings in this part of the exchequer, are by english bill and answer, according to the practice of the court of chancery ; with this difference, that the plaintiff here must likewise set forth that he is a debtor to the king, whether he be so or not. It is in this court of equity that the clergy exhibit bills for the recovery of their tithes, &c. Here too the attorney-general exhibits bills for any matters concerning the crown ; and a bill may be exhibited against the king's attorney by any person aggrieved in any cause prosecuted against him on behalf of the king, to be relieved therein : in which case, the plaintiff is to attend on the attorney-general with a copy of the bill, and procure him to give in an answer thereto ; in the

making of which he may call in any person interested in the cause, or any officer, or others, to instruct him, that the king be not prejudiced thereby, and his answer is to be put in without oath.

But besides the business relating to debtors, farmers, receivers, accountants, &c. all penal punishments, intrusion, and forfeitures upon popular actions, are matters likewise cognizable by this court ; where there also sits a puisne-baron, who administers the oaths to high sheriffs, bailiffs, auditors, receivers, collectors, controllers, surveyors and searchers of all the customs, &c. See the articles **BARON**, **CHANCELLOR**, &c.

The exchequer in Scotland, has the same privileges and jurisdiction as that of England ; and all matters competent to the one, are likewise competent to the other.

*Black book of the EXCHEQUER*, a book containing a description of the court of England in 1175, and its officers, with their ranks, wages, privileges, perquisites, &c. also the revenues of the crown, both in money and cattle.

**EXCIPIENT**, in pharmacy, denotes the ingredient, which, in compound medicines, receives all the rest ; as the conserve in electuaries, the syrup in boluses, &c.

**EXCISE**, a certain duty or impost charged upon liquors, as beer, ale, cyder, &c. malt, and several other commodities, within the kingdom of Great Britain, and town of Berwick upon Tweed.

The excise is one of the most considerable branches of the king's revenue. It was formerly farmed out, but is now managed for the king by commissioners in both kingdoms, who receive the whole product of the excise, and pay it into the exchequer. These commissioners are nine in number in England, and four in Scotland. The former have a salary of 1000*l.* a year, the latter, 500*l.* They are obliged by oath to take no fee or reward but from the king himself ; and from them there lies an appeal to five other commissioners, called commissioners of appeals.

The duty of excise was first granted to king Charles II. by act of parliament in the year 1660, during the life of that monarch. It was 15*d.* *per* barrel upon every barrel of beer or ale above 6*s.* the barrel, and 3*d.* *per* barrel for every barrel of 6*s.* or under, brewed for retail ; 15*d.* for every hoghead of cyder or perry sold by retail, 1*d.* for every gallon  
of

of strong water, aqua vitæ, &c. 2. A new excise was granted for ever by the fifth money act of Will. and Mary, being for every barrel of beer or ale above 6 s. the barrel, 9 d. and for every barrel of 6 s. or under, 3 d. for every hoghead of cyder or perry, 1 s. *per* hoghead. In this excise, the price of the liquor is to be reckoned exclusive of the duty. 3. An excise was granted of 6 d. a bushel on malt in the reign of king William, which by subsequent statutes has been continued yearly every since. But such malt as shall be made for exportation, and be so entered and kept separate from other malt, is exempted from the payment of this duty. 4. Another new excise upon home-made liquors was granted in queen Anne's reign; being an additional excise upon every barrel of beer or ale brewed for sale above 6 s. the barrel, 3 d. exclusive of the duties; and for every barrel at 6 s. or under, 1 d. for every hoghead of cyder or perry, 5 d. for every gallon of strong waters or aqua vitæ, 1 d. This excise was not laid upon any such liquors imported. 5. An excise on candles was first granted in the reign of queen Anne, and continued for ever, being a duty of 4 d. a pound on wax and a halfpenny the pound on tallow-candles, made in Great Britain for sale or not for sale; but makers for their own use may compound for 1 s. a head for every person in their family. An additional excise on candles was afterwards granted, being the same with the former in every respect. 6. An excise upon hides and skins tanned in Britain, first granted in queen Anne's reign, was an excise of seventeen different kinds, upon so many different kinds of hides and skins particularly named, and upon all others not named, 13 l. *per cent. ad valorem*. An additional excise was afterwards granted, being an additional duty of different kinds, upon so many different sorts of hides and skins particularly named, and on all others not named, 15 l. *per cent.* on the value. 7. An excise on home-made vellum and parchment, first granted by the same act, being 1 s. *per* dozen on vellum, and 6 d. the dozen on parchment. And afterwards an additional excise on vellum, &c. was granted, being an additional duty of 2 s. the dozen on vellum, and 1 s. the dozen on parchment. 8. An excise on hops of home growth was first granted in queen Anne's reign, being 1 d. *per* pound. 9. An excise on paper, paste-

boards, milled-boards, and scale-boards, was first granted in the reign of queen Anne, being a duty of eleven different kinds on so many different sorts of paper particularly named, made in Great Britain; on paste-boards, &c. 3 s. the hundred weight, and on all sorts of paper not named, 12 l. *per cent.* on the value. An additional duty on paper, &c. was granted of eleven different kinds, &c. on paste-board, 1 s. 6 d. the hundred weight, and on all sorts of paper not named, 6 l. *per cent.* on the value; and on painted paper for hangings, a halfpenny the yard square. 10. An excise of 1 d. *per* pound on soap made in Great Britain, was granted by the same act; to which an additional excise has been added of a halfpenny *per* pound. 11. An excise upon printed silks, callicoos, linnens and stuffs made in Great Britain, and printed, painted, stained or dyed here, was first granted in queen Anne's reign, being a duty of 3 d. on silks and callicoos, and 1 ½ d. on linnen and stuffs the yard square, excepting silk-handkerchiefs, linnens and suitains dyed of one colour, and stuffs made of woollen, or the greatest part in value of woollen. And an additional excise was granted of 6 d. the yard of half-yard broad silks; 1 d. the yard square of silk handkerchiefs; 3 d. the yard square of callicoos, and 1 ½ d. the yard square of linnens and stuffs, excepting, as before, callicoos, &c. dyed of one colour, and woollen stuffs. 12. An excise on starch was first granted for 1 d. the pound; and afterwards an additional excise of 1 d. the pound. 13. The excise on gilt and silver wire made in Great Britain, is 8 d. the ounce on gilt wire, and 6 d. the ounce on silver wire. If any brewers do not make true entries of their liquors brewed, once a week at the excise-office, they forfeit 10 l. but this is subject to mitigation, so as not to be less than double the duty; and the retailers of beer and ale and strong waters, neglecting to make their entries once a month of what liquors they retail, are liable to 40 s. penalty. In case any brewer erects or alters any back, copper, cooler, &c. or keeps a private store-house, or if any malster keeps any private vessel for steeping barley, without giving proper notice to the officers of excise, such brewer or malster forfeit 50 l. and where they bribe a gauger, it is 10 l. The officers of excise may go on board ships, and search for any exciseable liquors, as officers of the customs do, and seize commo-

alties forfeited, &c. and complaints made at the chief office of excise, are to be heard by three or more commissioners; but two justices of the peace have the power to determine, in seizures out of the limits of the excise-office in London.

**EXCLAMATION**, in rhetoric, a figure that expresses the violent and sudden breaking out, and vehemence of any passion. Such is that in the second book of Milton's *Paradise Lost*.

O unexpected stroke, worse than of death!  
Must I thus leave thee, Paradise? Thus leave

Thee, native soil; these happy walks and shades,

Fit haunt of gods!

Other figures are the language of some particular passion; but this expresses them all. It is the voice of nature, when she is in concern and transport.

**EXCLUSION**, or *Bill of Exclusion*, a bill proposed about the close of the reign of king Charles II. for excluding the duke of York, the king's brother, from the throne, on account of his being a papist.

**EXCLUSION**, in mathematics, is a method of coming at the solution of numerical problems, by previously throwing out of our consideration such numbers as are of no use in solving the question. Mr. Frencicle gives an account of it in the *Ouvrages de Mathématique, &c.*

**EXCLUSIVE**, is sometimes used adjectively, thus. *A parent carries with it an exclusive privilege*; and sometimes adverbially, as, *he sent him all the numbers from n<sup>o</sup> 145 to n<sup>o</sup> 247 exclusive*; that is, all between these two numbers, which themselves were excepted.

**EXCLUSIVE PROPOSITIONS**, in logic, are those where the predicate so agrees with its subject, as to exclude every other. Thus, *virtue alone constitutes nobility*, is an exclusive proposition.

**EXCOMMUNICATION**, an ecclesiastical penalty or censure whereby such persons as are guilty of any notorious crime or offence, are separated from the communion of the church, and deprived of all spiritual advantages.

Excommunication among the Jews, according to Elias; a german rabbin, was distinguished into three kinds, 1. *Niddui*, which was a separation of but a few days. 2. *Cherem*, a separation attended with execration and malediction. And, 3. *Shammatha*, which was the last and greater excommunication. But Selden

says, that *niddui* and *shammatha* are the same thing, and therefore that there were but two kinds of excommunication among the Jews, viz. the greater and the lesser. They made also another distinction in excommunication, into total or universal, by which a man was excommunicated with regard to all men; and partial, by which a man was excommunicated in one city, and with regard to certain persons, and not others.

It is observable, that not only the judges had the power of excommunicating, but that each particular person in conversation might excommunicate another, and himself likewise; and this excommunication, if well grounded, was of force: nay, if a man dreamed that he was excommunicated by himself or by another, he was considered as an excommunicated person, because this dream was supposed to be sent from God.

As to the effects of the jewish excommunication, the lesser excluded the excommunicated person from the society of men; that is, he was not to come nearer them than four cubits, neither he, his wife, children, or domestics, according to Buxtorf. The greater absolutely sequestered the person from the conversation of others; and sometimes he was shut up in a small chamber or prison, where he lived alone. Baronius and Beza pretend, that the greater excommunication excluded men from the use of sacred things. Selden, on the contrary, affirms, that they were allowed to be present in the temple, and partake of the public worship. Buxtorf, who is of the same opinion, adds, that whereas others came into the temple at the right hand, and went out at the left, the excommunicated were obliged both to go in and out at the left.

Excommunication among the modern Jews, is attended with the most terrible consequences. The excommunicated person is refused all human assistance: if there be a corpse in his house, or a child to be circumcised, none must help him. He is cursed by the book of the law, by the curse of Joshua against Jericho, by that of Elisha against the children, by heaven and earth, and God is besought that a whirlwind may dash him to pieces. He is pelted with stones if he appear in the streets; and if he obtains absolution, it is upon the most mortifying conditions; for he is publicly tied to a post and whipped, after which he lays him-  
self

self down at the door of the synagogue, and all those who go out, pass over him. This was the very case of the famous Jew Acofta. See BAYLE in the article Acofta.

In the antient christian church, the power of excommunication, as well as other acts of ecclesiastical discipline, was lodged in the hands of the clergy, who distinguished it into the greater and lesser. The lesser excommunication simply called *anathema*, separation or suspension, consisted in excluding men from the participation of the eucharist, and the prayers of the faithful. But they were not expelled the church; for they had the privilege of being present at the reading of the scriptures, the sermons, and the prayers of the catechumens and penitents. This excommunication was inflicted for lesser crimes, such as neglecting to attend the service of the church, misbehaviour in it, and the like.

The greater excommunication, called *anathema*, total separation and anathema, consisted in an absolute and entire exclusion from the church and the participation of all its rites. When any person was thus excommunicated, notice was given of it by circular letters to the most eminent churches all over the world, that they might all confirm this act of discipline, by refusing to admit the delinquent to their communion. The consequences of this latter excommunication was very terrible. The excommunicated person was avoided in civil commerce and outward conversation. No one was to receive him into his house, nor eat at the same table with him; and when dead, he was denied the solemn rites of burial. It has been a question, whether the antient church used to add execration to her censures. Grotius thinks this was done, though very seldom, as in the case of Julian the apostate, for whose destruction the antient christians absolutely prayed to God. St. Chrysostom was utterly against this practice, affirming that we ought not to pray against the sinner, but against his opinions or actions.

The romish pontifical takes notice of three kinds of excommunication. 1. The minor, incurred by those who have any correspondence with an excommunicated person. 2. The major, which falls upon those who disobey the commands of the holy see, or refuse to submit to certain points of discipline; in consequence of which they are excluded from the church

militant and triumphant, and delivered over to the devil and his angels. 3. Anathema, which is properly that pronounced by the pope against heretical princes and countries. In former ages, these papal fulminations were most terrible things; but at present, they are formidable to none but a few petty states of Italy. See ANATHEMA and FULMINATION.

Excommunication in the greek church, cuts the offender off from all communion with the 318 fathers of the first council of Nice, and with the saints; consigns him over to the devil and the traitor Judas; and condemns his body to remain after death as hard as a flint or piece of steel, unless he humbles himself and makes atonement for his sins by a sincere repentance. The form abounds with dreadful imprecations; and the Greeks assert, that if a person dies excommunicated, the devil enters into the lifeless corpse; and therefore in order to prevent it, the relations of the deceased cut his body in pieces, and boil them in wine. It is a custom for the patriarch of Jerusalem annually to excommunicate the pope and the church of Rome; on which occasion, together with a great deal of idle ceremony, he drives a nail into the ground with a hammer, as a mark of malediction.

The form of excommunication in the church of England, antiently ran thus: "By the authority of God the father almighty, the Son and Holy Ghost, and of Mary the blessed mother of God, we excommunicate, anathematize, and sequester from the pale of holy mother church," &c. The causes of excommunication with us, are contempt of the bishop's court, heresy, neglect of public worship and the sacraments, incontinency, adultery, simony, &c. It is published in the church, and if the offender does not submit in forty days, the civil magistrate interposes, and the excommunicated person is imprisoned till he submits and obtains absolution. Excommunication disables a person from doing any judicial act, as suing in an action at law, being a witness, &c. See EXCOMMUNICATIO CAPIENDO, &c.

Excommunication, among the pagans, excluded the person from the sacrifices and the temples, and delivered him over to the furies, which was called *exsecrare* and *diris devovere*. When Marcus C. Craffus set out on his expedition against the Parthians, Atticus, tribune of the people,

people, not being able to prevent him, ran to the gate of the city through which the general was to pass, and setting a chafing-dish in the middle of the way with fire in it, when Crassus drew near, he threw some perfumes into the chafing-dish, and pronounced curses against Crassus with great exclamation, and thus excommunicated him.

**EXCOMMUNICATO CAPIENDO**, a writ issued from the chancery upon the bishop's certifying an excommunication. This writ is directed to the sheriff to take the body of the person excommunicated, and imprison him until he has made satisfaction to the church for the contempt or wrong done. See **EXCOMMUNICATION**. In the certificate of an excommunication, the cause is to be particularly expressed, that the judges may see whether the ecclesiastical court has cognizance of the cause; and if the ordinary excommunicate a person for a thing of which he hath no cognizance, the party may bring an action against him, and in some cases may be delivered by habeas corpus, or by prohibition.

**EXCOMMUNICATO DELIBERANDO**, a writ directed to a sheriff for the delivery of an excommunicated person, upon the bishop's certifying to the king, that he hath conformed to the ecclesiastical jurisdiction.

**EXCOMMUNICATO RECIPIENDO**, a writ where excommunicated persons being committed to prison, and afterwards illegally delivered, are commanded to be retaken and imprisoned again.

**EXCORIATION**, in medicine and surgery, the galling or rubbing off the cuticle, especially of the parts between the thighs, and about the anus.

In adults, it is occasioned by riding, much walking, or other vehement exercise, and may be cured by vulnerary applications. In children, there is often an excoriation not only of the parts near the pudenda, chiefly of the groin and scrotum, but likewise in the wrinkles of the neck, under the arms, and in other places; proceeding from the acrimony of the urine and sweat, and occasioning itching pains, crying, watching, and restlessness.

To remedy this, the parts affected may be washed often with warm water, and sprinkled with drying powders, as chalk, hartshorn, but especially tutty, lapis calaminaris, and ceruss, which may be tied loosely in a rag, and the powder shook out on the disordered places. If the parts tend to a real ulceration, it will be proper

to add a little sugar of lead to the powder, or to anoint the place with ungent. alb. camphor. Likewise a little white vitriol, dissolved in spring-water, and daubed upon the part, will dry and heal it very powerfully.

**EXCORTICATION**, the same with barking of trees. See the article **BARKING**.

**EXCREMENT**, whatever is discharged out of the body of animals after digestion, or the fibrous parts of the aliment, mixed with the bile, saliva, and other fluids. Urine and the fæces are the gross excrements that are discharged out of the bladder or belly. Other excrements are the various humours that are secreted from the blood through the various strainers in the body, and which serve for several uses, such as the saliva, sweat, bile, the pancreatic juice, lymph, the semen, nails, the hair, the horns and hoofs of animals. The ejection of excrements is an evacuation by urine, stool, spittle, &c. Unless the excretions are regular, health cannot be maintained, and therefore, if they are too plentiful, defective, or suppressed, they will occasion various disorders: hence, if a person be costive, it is generally the forerunner of some disease. As a man generally takes more aliment than is necessary to generate blood and serum, and the common excretions are not sufficient to carry off superfluous humours, extraordinary ones sometimes happen, at stated times; as the piles, hæmorrhages, &c. See more upon this under the articles **DISEASE** and **EXCRETION**.

**EXCRESCENCE**, in surgery, denotes every preternatural tumour which arises upon the skin, either in the form of a wart or tubercle. If they are born with a person; as they frequently are, they are called *naevi materni*, or marks from the mother; but if the tumour is large, so as to depend from the skin like a fleshy mass, it is then called a sarcoma.

Excrecences arise in all parts of the body, but more especially the head, face, eye-brows, neck, breast, abdomen, anus, legs, and arms. Their size and figure are various; with regard to their colour, some resemble that of the skin, others are inclined to black or red; and, with respect to their figure, they resemble strawberries, mulberries, grapes, figs, pears, mice, and the like.

As to the general treatment of them, they may be removed either by ligature, the knife, or actual and potential cauteries, according as the patient's habit of

body and other circumstances may require. However, it is to be observed, that if these excrescences have a very large root, if there are large arteries or veins near the root, or if it be firmly joined to the bone, in these cases, the surgeon should remove them with great caution; or, in cases of great danger, wholly neglect them. When these tumours lie near large blood-vessels, it is proper to have styptics, bandages, and often actual cauteries in readiness to stop the hæmorrhage, especially if they are removed by abscission.

**EXCRETION**, or **SECRETION**, in medicine, a separation of some fluid, mixed with the blood, by means of the glands. Excretions, by which we mean those that evacuate superfluous and heterogeneous humours, purify the mass of blood: the humours which are generated in the blood are excreted by the glands, and are replaced by a sufficient quantity of aliment. This, in adults, keeps the body of an equal weight, and consequently preserves life and health: therefore the secretions ought neither to be disturbed or diminished, suppressed or increased: the extraordinary excretions, such as the bleeding piles, and hæmorrhages of the nose, also large sweats, looseness, running at the nose, coughs, catarrhs, plentiful spitting, all promote health; and if these are defective or suppressed, dangerous diseases may arise: wherefore it is highly hazardous to suppress secretions of this kind. See the article **EXCREMENT**.

**EXCRETORY**, in anatomy, a term applied to certain little ducts or vessels, destined for the reception of a fluid, secreted in certain glandules, and other viscera, for the excretion of it in the appropriated places. See the preceding article.

All the glands are usually furnished with an excretory duct. See **GLAND**.

**EXCURSION**, in astronomy, is used in a synonymous sense with elongation. See the article **ELONGATION**.

*Circles of EXCURSION.* See the preceding article.

**EXCUTIA VENTRICULI**, in surgery, the stomach-brush. See **STOMACH**.

**EXECRATION**, *execratio*, in antiquity, a kind of punishment, consisting of direful curses and marks of infamy: such was that used against Philip king of Macedon, by the Athenians. A general assembly of the people being called, they made a decree, that all the statues and images of that king, and of all his an-

cestors, should be demolished, and their very names razed; that all the festivals, sacred rites, priests, and whatever else had been instituted in honour of him, should be prophaned; that the very places where there had been any monument or inscription to his honour, should be detestable; that nothing should be set up, or dedicated in them, which could be done in clean places: and, lastly, that the priests, as often as they prayed for the athenian people, allies, armies, and fleets, should as many times detest and execrate Philip, his children, kingdom, land and sea forces, and the whole race and name of the Macedonians.

At the taking and demolishing a city, it was frequent to pronounce dreadful curses and execrations upon whoever should endeavour to rebuild it; which some imagine was the reason that Troy could never be raised out of its ashes, though several persons attempted it, being devoted to eternal and irreparable ruin by Agamemnon. We find Joshua at the destruction of Jericho, fix an imprecation upon the person who should endeavour to rebuild it, which was accomplished in Hiel the Bethelite, many ages after.

**EXECUTION**, in a general sense, the act of accomplishing, finishing, or achieving any thing to be done.

**EXECUTION**, in law, the completing or finishing some act, as of judgment, deed, &c. and it usually signifies the obtaining possession of any thing recovered by judgment of law. See **JUDGMENT**.

Sir Edward Coke observes, that there are two sorts of executions: the one final, and the other a quousque, that tends to an end. An execution final, is that which makes money of the defendant's goods, or extends to his lands, and delivers them to the plaintiff, who accepts the same in satisfaction; and this is the end of the suit, and the whole that the king's writ requires to be done. The writ or execution with a quousque, though it tends to an end, yet is not final, as in the case of a *capias* ad satisfaciendum, where the defendant's body is to be taken, in order that the plaintiff may be satisfied for his debt. See the article **CAPIAS**.

Executions are either in personal, real, or mixed actions. In a personal action, the execution may be made three ways, *viz.* by the writ of *capias* ad satisfaciendum, against the body of the defendant; *fieri facias*, against his goods; or *elegit*, against his lands. See **FIERI FACIAS** and **ELEGIT**.

In

In a real and mixed action, the execution is by writ of *habere facias seisinam*, and *habere possessionem*. See *HABERE*. Writs of execution bind the property of goods only from the time of delivery of the writ to the sheriff; but the land is bound from the day of the judgment obtained: and here the sale of any goods for valuable consideration, after a judgment, and before the execution awarded, will be good. It is otherwise as to lands, of which execution may be made, even on a purchase after the judgment, though the defendant sell such land before execution. Likewise, sheriffs may deliver in execution all the lands whereof others shall be seised in trust for him, against whom execution is had on a judgment, &c.

When any judgment is signed, the execution may be taken out immediately thereon; but if it be not issued within a year and a day after, where there is no fault in the defendant, as in the case of an injunction, writ of error, &c. there must be a *scire facias* to revive the judgment; though, if the plaintiff sues out any writ of execution within the year, he may continue it after the year is expired. After judgment against the defendant, in an action wherein special bail is given, the plaintiff is at liberty to have execution against such defendant, or against his bail: but this is understood where the defendant does not render himself, according to law, in safeguard of the bail: and execution may not regularly be sued forth against a bail, till a default is returned against the principal: also, if the plaintiff takes the bail, he shall never take the principal. It is held that an execution may be executed after the death of the defendant; for his executor, being privy thereto, is liable, as well as the testator. The execution is an entire thing, so that he who begins must end it: therefore, a new sheriff may distrain an old one, to sell the goods seised on a distress, and to bring the money into court.

**EXECUTION of judgment**, in criminal cases. This must be pursuant to the judgment, and the king may not alter it, for this reason, that no execution can be warranted by law, but where it is according to the judgment given; yet the king may pardon part of the execution in judgment for treason, *viz.* all but beheading.

The execution of criminals is to be made by the proper officer; and if the sheriff, or other officer empowered to do it, alters the execution, or any other executes an offen-

der, or if he be killed without authority of law, it is felony. Where a person condemned to die comes to life after he is hanged; in this case, as the judgment is not executed till he is dead, he ought to be hung up again. And the bodies of felons are forfeited to the king by the execution, who may dispose of them as he pleases.

**Military EXECUTION**, the pillaging or plundering of a country, by the enemy's army.

**EXECUTIONE FACIENDA**, a writ that issues for the execution of a judgment, and is used in divers cases. See the articles *EXECUTION* and *JUDGMENT*.

**EXECUTIONE FACIENDA IN WITHERNAM**, a writ which lies for taking a person's cattle, who has conveyed the cattle of another out of the country, so that the sheriff is not able to replevy them.

**EXECUTIONE JUDICII**, a writ directed to the judge of an inferior court, commanding him to execute a judgment therein, or to return reasonable cause why he delays the execution.

If on this writ execution be not done, or some reasonable cause shewn why it is delayed, an alias shall issue, and afterwards a pluries, &c. And if on this last writ execution is not done, or some reasonable cause returned for its being so delayed, the party shall have an attachment against him who delays the same, and the attachment is made returnable in the king's bench or common pleas.

**EXECUTOR**, in law, a person appointed by another's last will and testament, to have the execution of the same after his decease, and the disposing of the testator's goods and effects, according to the intent of the will.

The law accounts an executor one person with the party whose executor he is; having all the advantages of action, and being subject to the same actions as the deceased.

Hence as an executor derives his power wholly from the will, he may release a debt, or do any thing as executor, before probate of the will, provided he afterwards proves it: however, to maintain actions for debts, he must shew the testament proved. He may immediately take the goods, or give power to another to seize them for him.

A person capable of making an executor, either makes one, two, three, or more; and he may appoint, that one shall be his executor for one year, and another for another.

another. If he appoints executors only for a certain number of years, after they are elapsed, the ordinary may grant administration of the goods; as he may do, till the power of executors take place. It is also observable, that where there is no executor, there is properly no will; and where there is no will, there can be no executors: but this only regards goods; for where lands in fee are devised, it is a good will, though no executor be named therein.

An executor may either accept or refuse the executorship; but after he has accepted the office, he shall not refuse the same, nor take it up after refusal. If any one of several executors prove the will, it will serve for all; so that the rest may at any time after join with him, and intermeddle with the estate. When any action is brought, it must be in the names of all the executors, notwithstanding some of them may not act; but in any action commenced against them, he only that administers is to be sued. The possession of one executor, is held to be possession of them all; and most acts done by or to one, are deemed done by or to all of them.

The particular duty of an executor, is to bury the testator in a decent manner, according to his rank and circumstances, and with a due regard to the estate left; for whatever the executor lays out in funeral charges extravagantly, if there be not enough to pay debts, he must bear it at his own expence. He is to make an inventory of all the goods and chattels of the deceased, with their value; and then, or before, if requisite, where there is enough to pay the testator's debts and legacies, he ought to prove the will before the ordinary in common form, either by his own oath, or by witnesses, if required by those who have a right to question it: and when exhibited in the register's office of the ecclesiastical court, a copy thereof in parchment is delivered to the executor under the ordinary's seal, which is called the probate.

The executor is next to pay all debts, before legacies, in the order following, *viz.* the charges of the funeral being first paid, the king's debt is to be preferred before all others; then debts on judgments, and statutes or recognizances, those due upon mortgages, bonds, and other specialties; after them, rent on leases, servants wages, debts on notes,

and shop-books: for if he pays the debts in any other order, he is liable to the payment of debts of a higher degree, though out of his own estate; yet, among debts of equal degree, an executor may pay himself first: and such as are first sued for, shall be first paid; and if no suit be commenced, he may pay the whole debt to any one creditor, although there should be nothing left to pay another any part of his. In case the testator is bound in several bonds, his executor has the privilege to pay which bond he pleases, unless an action of debt is actually prosecuted against him upon some of the other bonds; and in such a case, if while an action of this kind is depending, another bond-creditor brings another action, before any judgment is obtained, he may prefer which he will by confessing a judgment to one, and paying him; which judgment may be pleaded in bar to the other action.

After the debts, an executor is to pay the legacies; and he may prefer a legacy to himself, though there should not be enough to pay any of the rest. He may likewise pay what legacies he pleases first, or give to each legatee a part, in proportion, if there is not enough to pay the whole. However, if there be a specific legacy of some particular thing, as a horse, or silver-cup, it must be delivered before any other legacy.

In case an executor pays out the assets in legacies, and afterwards debts appear, of which he had no notice, which he is obliged to pay; he may, by a bill in chancery, compel the legatees to refund.

After the debts and legacies are paid, whatever remains, it is said, belongs to the executor by the common law; but this has been construed, where the executor is a relation of the deceased, and had no legacy or other provision by the will. Hence, where a person made a will, and an executor, without disposing of the residue of his personal estate, it has been adjudged, that the remainder should not go to the executor, but be distributed among the relations of the testator by administration.

EXECUTOR DE SON TORT, or an executor of his own wrong, a person that takes upon him the office of an executor by intrusion, without being so constituted by the testator, or appointed by the ordinary to administer. Such a person is chargeable to the rightful executor, as also to



'all the testator's creditors and legatees, so far as the goods amount to which he wrongfully possessed.

**EXECUTORY**, in law, is where an estate in fee, that is made by deed or fine, is to be executed afterwards by entry, livery or writ. Leases for years, annuities, conditions, &c. are termed inheritances executory.

**EXECUTORY DEVISE**, is when the fee by devise is vested in any person, and is to be vested in another upon contingency. In all cases of executory devises, the estates descend until the contingencies happen. The remainder of a fee may not be limited by the rules of law after a fee simple, unless such estate depends upon a contingency or is conditional, when it may take place as an executory devise. Executory devises of terms for years, ought to arise within the compass of one life.

**EXEDRA**, in church-history, a name sometimes given to the ambo. See the article **AMBO**.

**EXEDRÆ**, in antiquity, a general name for such buildings as were distinct from the main body of the churches, and yet within the limits of the church taken in its largest sense. Among the exedræ the chief was the baptistery. See the article **BAPTISTORY**.

Exedræ were also halls or little academies with several seats, upon which philosophers, rhetoricians, &c. sat, when they met for conversation or disputation. Vitruvius speaks of them as places very open and exposed to the sun.

**EXEGESIS**, a discourse by way of explanation or comment upon any subject. In the Scotch universities, there is an exercise among the students in divinity called an exegesis, in which a question is stated by the respondent, who is then opposed by two or three other students in their turns; during which time the professor moderates, and solves the difficulties which the respondent cannot overcome.

**EXEGETICA**, a term used by some for the method of extracting the roots of equations. See the articles **EXTRACTION** and **EQUATION**.

**EXEMPLAR**, denotes much the same with model. See the article **MODEL**.

**EXEMPLIFICATION** of letters patent, a transcript or duplicate of them, made from the inrollment thereof, and sealed with the great seal.

These exemplifications are by statute equally effectual, and may be pleaded as well as the originals. One may exemplify

a patent under the great seal in chancery; also any record, or judgment, in any of the courts at Westminster, under the seal of each court; which exemplifications may be given in evidence to a jury. It is held, that nothing but matter of record ought to be exemplified.

**EXEMPLIFICATION**, in law, a writ granted for the exemplification of any original record. See the articles **EXEMPLIFICATION** and **RECORD**.

**EXEMPTION**, in law, a privilege to be free from some service or appearance: thus, barons and peers of the realm are, on account of their dignity, exempted from being sworn upon inquests; and knights, clergymen, and others, from appearing at the sheriff's turn. Persons of seventy years of age, apothecaries, &c. are also by law exempted from serving on juries; and justices of the peace, attornies, &c. from parish-offices.

**EXEMPTION**, in the church of Rome, a privilege granted by the pope to the clergy, and sometimes to the laity, to exempt or free them from the jurisdiction of their respective ordinaries. Thus monasteries, and even private priests, for a small charge, formerly procured exemptions from the jurisdiction of their bishops. In this, however, the council of Trent made a small reformation, by abolishing the exemption of particular priests, and monks not living in cloisters, and that of chapters in criminal matters.

**EXERCISE**, among physicians, such an agitation of the body as produces salutary effects in the animal oeconomy.

Exercise may be said to be either active or passive. The active is walking, hunting, dancing, playing at bowls, and the like; as also speaking, and other labour of the body and mind. The passive is riding in a coach, on horseback, or in any other manner. Exercise may be continued to a beginning of weariness, and ought to be used before dinner, in a pure light air; for which reason, journeys and going into the country contribute greatly to preserve and re-establish health.

Exercise increases the circulation of the blood, attenuates and divides the fluids, and promotes a regular perspiration, as well as a due secretion of all the humours; for it accelerates the animal spirits, and facilitates their distribution into all the fibres of the body, strengthens the parts, creates an appetite; and helps digestion. Whence it arises, that those

those who accustom themselves to exercise are generally very robust, and seldom subject to diseases.

Boerhaave recommends all bodily exercises in diseases of a weak and lax fibre. By riding on horseback, says his commentator, the pendulous viscera of the abdomen are shaken every moment, and gently rubbed as it were one against another, while in the mean time the pure air acts on the lungs with greater force. But it is to be observed, that a weak man should not ride on a full stomach, but either before dinner, or after the digestion is near finished; for when the stomach is distended, weak people do not bear these concussions of the horse, without difficulty; but when the *primæ viæ* are near empty, the remaining fæces are discharged by this concussion. Sailing in a ship is also an exercise of great use to weak people. If the vessel moves with an even motion, by increasing perspiration it usually excites a wonderful alacrity, creates an appetite, and promotes digestion. These exercises are more especially serviceable to weak people; but in order to corroborate the body by muscular motion, walking, running, and bodily exercises are to be used. In these we should begin with the most gentle, such as walking, and increase it by degrees till we come to running. Those exercises of the body are more especially serviceable which give delight to the mind at the same time, as tennis, fencing, &c. for which reason the wisdom of antiquity appointed rewards for those who excelled in these gymnastic exercises, that by this means the bodies of their youth might be hardened for warlike toils. See the article GYMNASTICS.

As nothing is more conducive to health than moderate exercise, so violent exercise dissipates the spirits, weakens the body, destroys the elasticity of the fibres, and exhausts the fluid parts of the blood. No wonder then, that acute and mortal fevers often arise from too violent exercise of the body; for the motion of the venal blood towards the heart being quickened by the contraction of the muscles, and the veins being thus depleted, the arteries more easily propel their contained humours through the smallest extremities into the now less resisting veins, and therefore the velocity of the circulation will be increased thro' all the vessels. But this cannot be per-

formed without applying the humours oftener, or in a greater quantity to the secretory organs in the same time, whence the more fluid parts of the blood will be dissipated, what remains will be inspissated, and by the greater action of the vessels upon their contained fluids, and of the reacting fluids upon the vessels, the blood acquires an inflammatory density. Add to this, that by the violent attrition of the solids and fluids, together with the heat thence arising, all the humours will incline to a greater acrimony, and the salts and oils of the blood will become more acrid and volatile. Hence, says Boerhaave, those fevers which arise from too much exercise or motion, are cured by rest of body and mind, with such aliments and medicines as moisten, dilate, and soften, or allay acrimony.

The exercise of a soldier in camp, considered as conducive to health, Dr. Pringle distinguishes into three heads, the first relating to his duty, the second to his living more commodiously, and the third to his diversions. The first consisting chiefly in the exercise of his arms, will be no less the means of preserving health, than of making him expert in his duty, and frequent returns of this early, and before the sun grows hot, will be made more advantageous than repeating it seldom, and staying out long at a time; for a camp affording little convenience for refreshment, all unnecessary fatigue is to be avoided. As to the second article, cutting boughs for shading the tents, making trenches round them for carrying off the water, airing the straw, cleaning their cloaths and accoutrements, and assisting in the business of the mess, ought to be no disagreeable exercise to the men for some part of the day. Lastly, as to diversions, the men must be encouraged to them either by the example of their officers, or by small premiums to those who shall excel in any kind of sports, as shall be judged most conducive to health; but herein great caution is necessary not to allow them to fatigue themselves too much, especially in hot weather, or sickly times; but above all, that their cloaths be kept dry, wet cloaths being the most frequent causes of camp diseases.

EXERCISE, in military affairs, is the ranging a body of soldiers in form of battle, and making them perform the several motions and military evolutions with

with different management of their arms, in order to make them expert therein.

**EXERCISES** are also understood of what young gentlemen learn in the academies and riding schools, such as fencing, dancing, riding the great horse, &c.

**EXERGUM**, among antiquarians, a little space around or without the figures of a medal, left for the inscription, cypher, device, date, &c.

**EXETER**, the capital city of Devonshire, situated on the river Ex, ten miles north of the british channel : west lon.  $3^{\circ} 40'$ , north lat.  $50^{\circ} 44'$ .

It is a bishop's see, sends two members to parliament, and gives the title of earl to a branch of the noble family of Cecil.

**EXFOLIATION**, a term used by surgeons for the scaling of a bone, or its rising and separating into thin laminæ or scales.

**EXFOLIATIVE TREPAN**, one for raising the flakes or scales of a bone, one after another. See the article **TREPAN**.

**EXFOLIATIVUM**, in surgery, the same with a raspatory. See **RASPATORY**.

**EX GRAVI QUERELA**, in law, is a writ, that lies for the person to whom any lands or tenements in fee are devised by will, and the heir of the devisor enters thereon, and detains them from the devisee. Also, where a person devises such lands to another in tail with the remainder over in fee : here if the tenant in tail enter, and is seized by force of the entail, and afterwards he dies without issue, the person in remainder, or reversion, may bring this writ to execute the devise. See the article **DEVISE**.

**EXHALATION**, a general term for all effluvia or steams raised from the surface of the earth, in form of vapour. See the articles **VAPOUR** and **EFFLUVIA**.

Some, indeed, distinguish exhalations from vapours ; expressing by the former, all steams emitted from solid bodies, as earth, fire, sulphur, salts, minerals, &c. and by the latter, the steams raised from water, and other fluids. Exhalations, therefore, according to them, are dry, subtle corpuscles, or effluvia, which are loosened and freed from hard earthy bodies, either by the heat of the sun, the agitation of the air, or the like causes ; and being blended in the atmosphere with the moist vapours, help to constitute or form clouds and meteors, See the article **CLOUD**, &c.

Nitrous and sulphureous exhalations are the chief matter of which thunder, lightening, and other meteors are generated in the air. True air is also generated by, or rather set at liberty along with, these exhalations, which it serves to buoy up in the atmosphere. See the articles **AIR** and **ATMOSPHERE**.

Mr. Boyle informs us, that the exhalations from mines are hot ; as are those ascending from some wells. See the article **DAMPS**, &c.

**EXHAUSTED RECEIVER**, a glass, or other vessel, out of which the air hath been drawn by means of the air-pump. See the article **AIR-PUMP**.

**EXHAUSTIONS**, in mathematics, a method in frequent use among the ancient mathematicians, as Euclid, Archimedes, &c. that proves the equality of two magnitudes, by a deduction ad absurdum, in supposing that, if one be greater, or less than the other, there would follow an absurdity.

This is founded upon what Euclid saith in his tenth book, *viz.* " That those " quantities, whose difference is less " than any assignable one, are equal." For if they were unequal, be the difference never so small, yet, it may be so multiplied, as to become greater than either of them : if not so, then it is really nothing. This he assumes in the proof of the 1st proposition of book 10, which is, " That if from the greater of " two quantities, you take more than " its half, and from the remainder " more than its half, and so continually, " there will, at length, remain a quantity less than either of those proposed."

On this foundation they demonstrate, that if a regular polygon of infinite sides be inscribed in, or circumscribed about, a circle ; the space that is the difference between the circle and the polygon will, by degrees, be quite exhausted, and the circle be equal to the polygon.

**EXHEREDATION**, *exhereditatio*, in the civil law, the exclusion of a son by the father from inheriting his estate ; termed, among us, disinheriting.

**EXHIBIT**, in law, is where a deed, or other writing, being produced in a chancery suit, to be proved by witnesses, the examiner, or commissioner appointed after the examination of any such, certifies on the back of the deed, or writing, that the same was shewn to the witness,

at the time of his examination, and by him sworn to.

**EXHIBITION**, a benefaction settled for the benefit of scholars in the universities, that are not on the foundation.

**EXHIBITION** was antiently an allowance for meat and drink, such as the religious appropriators made to the poor depending vicar.

**EXHORTATION**, in rhetoric, differs only from suasion, as being more directly addressed to the passions.

**EXHUMATION**, the digging up of a body interred in holy ground, by the authority of a judge. By the French law the exhumation of a dead body is ordered, upon proof that he was killed in a duel; and a parson may demand the exhumation of any of his parishoners, when interred out of the parish, without his consent.

**EXIGENT**, in law, a writ which lies where the defendant in a personal action cannot be found, nor any effects of his within the county, by which he may be attached or distrained.

This writ is directed to the sheriff, to proclaim and call the defendant five county-court days, one after another, charging him to appear under the pain of outlawry. Where a person indicted of felony, &c. absents himself so long, that the writ of exigent is awarded against him, such a withdrawing will be deemed a flight in law, whereby he is liable to forfeit his goods, and though he afterwards renders himself on the exigent, and is found not guilty, 'tis said the forfeiture shall stand: but if the party was in prison, or beyond the seas, he, or his executors, may reverse the award of the exigent, by writ of error. Upon all exigents, a proclamation shall be issued out to make proclamations in the county where the defendant dwells, for him to yield himself, &c.

**EXIGENTERS**, four officers in the court of Common-Pleas, who make all exigents and proclamations, in all actions where process of outlawry lies. Writs of supersedeas, as well as the prothonotaries upon exigents, were likewise drawn up in their office.

**EXILE**, the same with banishment. See the article **BANISHMENT**.

**EXILIUM**, in law, signifies a spoiling; but seems to be restrained to the injury done to tenants by altering their tenure, ejecting them, &c.

**EXILLES**, a strong fortress on the frontiers of Dauphine and Piedmont, about ten miles west of Susa, and twenty-five north-west of Turin: east long. 7°, north lat. 45° 5'.

**EXISTENCE**, that whereby any thing has an actual essence, or is said to be. See the article **ESSENCE**.

Mr. Locke says, that we arrive at the knowledge of our own existence, by intuition; of the existence of God, by demonstration; and of other things, by sensation. As for our own existence, continues that great philosopher, we perceive it so plainly, that it neither needs, nor is capable of, any proof. I think, I reason, I feel pleasure and pain; can any of these be more evident to me than my own existence? If I doubt of all other things, that very doubt makes me perceive my own existence, and will not suffer me to doubt it. If I know I doubt, I have as certain a perception of the thing doubting, as of that thought which I call doubt: experience then convinces us, that we have an intuitive knowledge of our own existence.

From the knowledge of our own existence, Mr. Locke deduces his demonstration of the existence of a God. See the article **GOD**.

It has been a subject of great dispute whether external bodies have any existence but in the mind, that is, whether they really exist, or exist in idea only: the former opinion is supported by Mr. Locke, and the latter by Dr. Berkley. The knowledge of the existence of other things, or things without the mind, we have only by sensation: for there being no necessary connection of real existence with any idea a man hath in his memory, nor of any other existence, but that of God, with the existence of any particular man; no particular man can know the existence of any other being but only, when, by operating upon him, it makes itself be perceived by him. The having the idea of any thing in our mind no more proves the existence of that thing, than the picture of a man evidences his being in the world; or the visions of a dream make a true history. It is therefore the actual receiving of ideas from without, that gives us notice of the existence of other things, and makes us know that something does exist at that time without us, which causes that idea in us, though perhaps

we neither know nor consider how it does it. This notice, which we have by our senses of the existence of things without us, though it be not altogether so certain as intuition and demonstration, yet deserves the name of knowledge, if we persuade ourselves that our faculties act, and inform us right concerning the existence of those objects that affect them: but besides the assurance we have from our senses themselves, that they do not err in the information they give us of the existence of things without us, we have other concurrent reasons; as, first, It is plain these perceptions are produced in us by external causes affecting our senses, because those that want the organs of any sense never can have the ideas belonging to that sense produced in their minds. Secondly, because we find sometimes that we cannot avoid the having those ideas produced in our minds. When my eyes are shut, I can, at pleasure, recal to my mind the ideas of light, or the sun, which former sensations had lodged in my memory; but if I turn my eyes towards the sun, I cannot avoid the ideas which the light or the sun then produces in me; which shews a manifest difference between those ideas laid up in the memory, and such as force themselves upon us, and we cannot avoid having: besides, there is nobody who doth not perceive the difference in himself between actually looking on the sun, and contemplating the idea he has of it in his memory; and therefore he hath certain knowledge that they are not both memory or fancy. Thirdly, add to this, that many ideas are produced in us with pain, which we afterwards remember without the least offence: thus the pain of heat, or cold, when the idea of it is revived in our minds, give us no disturbance, which when felt, was very troublesome; and we remember the pain of hunger, thirst, head-ach, &c. without any pain at all, which would either never disturb us, or else constantly do it, as often as we thought of it, were there no more but ideas floating in our minds, and appearances entertaining our fancies, without the real existence of things affecting us from abroad. Fourthly, our senses in many cases bear witness to the truth of each others report concerning the existence of sensible things without us: he that doubts when he sees a fire, whether it be real, may, if he

pleases, feel it too, and by the exquisite pain, may be convinced that it is not a bare idea, or phantom. *Locke.*

Dr. Berkeley on the other hand contends, that external bodies have no existence but in the mind perceiving them; or that they exist no longer, than they are perceived: his principal arguments, which several others, as well as himself, esteem a demonstration of this system, are as follow. That neither our thoughts, passions, nor ideas formed by the imagination, exist without the mind, is allowed; and that the various sensations impressed on the mind, whatever objects they compose, cannot exist otherwise than in a mind perceiving them, is equally evident. This appears from the meaning of the term exist, when applied to sensible things: thus, the table I write on, exists, *i. e.* I see and feel it; and were I out of my study, I should say it existed, *i. e.* that were I in my study, I should see and feel it as before. There was an odour, *i. e.* I smelt it, &c. but the existence of unthinking beings without any relation to their being perceived is unintelligible: their *esse* is *percipi*. Then to shew that the notion of bodies is grounded on the doctrine of abstract ideas, What, he asks, are light and colours, heat and cold, extension and figure, in a word, the things we see and feel, but so many sensations, notions, ideas, or impressions on the sense; and is it possible to separate, even in thought, any of these from perception? The several bodies then, that compose the frame of the world, have not any subsistence without a mind: their *esse* is to be perceived or known; and if they are not perceived by me, nor by any other thinking being, they have no shadow of existence at all: the things we perceive are colour, figure, motion, &c. that is, the ideas of those things; but has an idea any existence out of the mind? To have an idea is the same thing as to perceive; that, therefore, wherein colour, figure, &c. exist, must perceive them. It is evident, therefore, that there can be no unthinking substance, or substratum of those ideas. But you may argue, if the ideas themselves do not exist without the mind, there may be things like them, whereof they are copies or resemblances, which exist without the mind. It is answered, an idea can be like nothing but an idea, a colour or figure can be nothing else but another

colour or figure. It may be farther asked, whether those supposed originals or external things, whereof our ideas are the pictures, be themselves perceivable or not? If they be not, I appeal to any one whether it be sense to say, a colour is like somewhat which is invisible; hard or soft, like somewhat intangible, &c. Some distinguish between primary and secondary qualities, the former, *viz.* extension, solidity, figure, motion, rest, and number, have a real existence out of the mind; for the latter, under which come all other sensible qualities, as colours, sounds, tastes, &c. they allow the ideas we have of them are not resemblances of any thing without the mind, or unperceived, but depend on the size, texture, motion, &c. of the minute particles of matter. Now it is certain, that those primary qualities are inseparably united with the other secondary ones, and cannot even in thought be abstracted from them; and, therefore, must only exist in the mind. Again, great or small, swift or slow, are allowed to exist no where without the mind, being merely relative, and changing, as the frame or position of the organ changes: the extension, therefore, that exists without the mind, is neither great nor small; the motion, neither swift nor slow, *i. e.* they are nothing. That number is a creature of the mind is plain (even though the other qualities were allowed to exist) from this, that the same thing bears a different denomination of number as the mind views it with different respects: thus the same extension is 1, 3, or 36, as the mind considers it, with reference to a yard, a foot, or an inch.

In effect, after the same manner, as the modern philosophers prove colours, tastes, &c. to have no existence in matter, or without the mind, the same thing may be proved of all sensible qualities whatever: thus they say, heat and cold are only the affections of the mind, not at all patterns of real beings existing in corporeal substances, for that the same body which seems cold to one hand seems warm to another. Now why may we not as well argue that figure and extension are not patterns or resemblances of qualities existing in matter, because, to the same eye, at different stations, or to eyes of different structure, at the same station, they appear various. Again, sweetness, it is proved, does not exist in the thing *spad*, because the thing re-

maining unaltered, the sweetness is changed to bitterness, as in a fever, or by an otherwise vitiated palate. Is, it not as reasonable to say, that motion does not exist out of the mind, since if the succession of ideas in the mind become sinister, the motion, it is acknowledged, will appear slower, without any external alteration. Again, were it possible for solid figured bodies to exist out of the mind, yet it were impossible for us ever to know it: our senses, indeed, give us sensations of ideas, but do not tell us that any thing exists without the mind, or unperceived, like those which are perceived; this the materialists allow. No other way, therefore, remains, but that we know them by reason's inferring their existence from what is immediately perceived by sense: but how should reason do this, when it is confessed there is not any necessary connection between our sensations and these bodies. It is evident from the phenomena of dreams, phrensies, &c. that we may be affected with the ideas we now have, though there were no bodies existing without them; nor does the supposition of external bodies at all forward us in conceiving how our ideas should come to be produced.

As to the existence of spirits, Mr. Locke says, that our having ideas of them does not make us know that any such things do exist without us, or that there are any finite spirits, or any other spiritual beings but the eternal God. We have ground from revelation, and several other reasons, to believe with assurance that there are such creatures; but our senses not being able to discover them, we want the means of knowing their particular existence; for we can no more know that there are finite spirits really existing by the idea we have of such beings, than by the ideas any one has of fairies or centaurs, he can come to know that things answering those ideas do really exist.

**EXIT, exitus**, in law, properly signifies issue or offspring; but is also applied to issues, annual rents, and profits of lands.

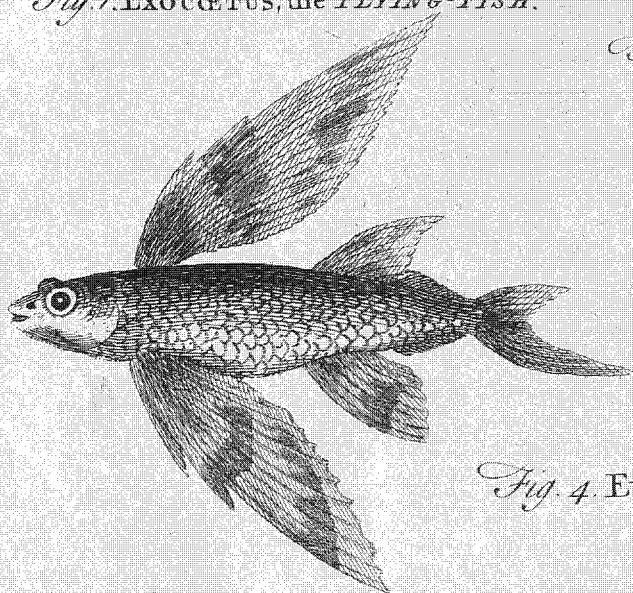
**EXIT**, in a theatrical sense, the action of a player in going off the stage, after he has played his part.

To do this with propriety, or in a manner suitable to the occasion, is by no means the least difficult part of a player's office.

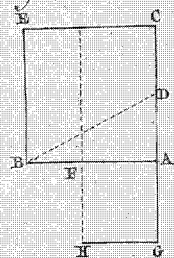
**EXLE-**



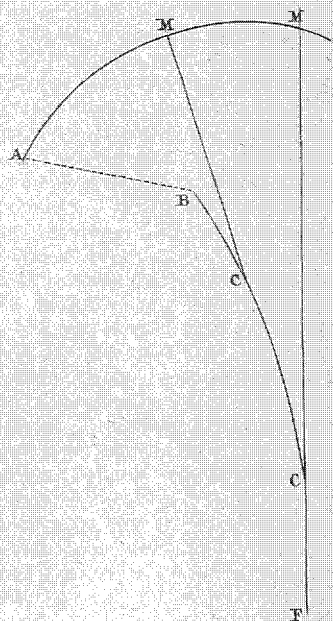
*Fig. 1. EXOCÆTUS, the FLYING-FISH.*



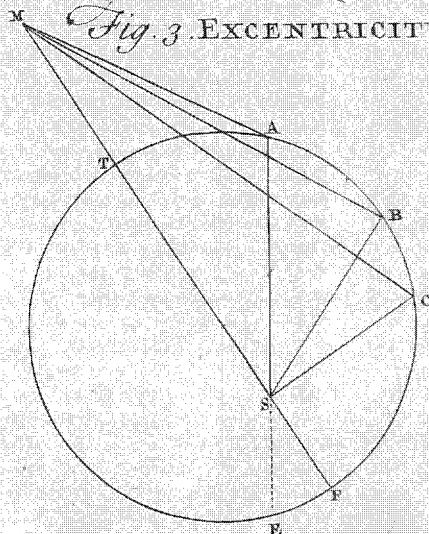
*Fig. 2. EXTREME.*



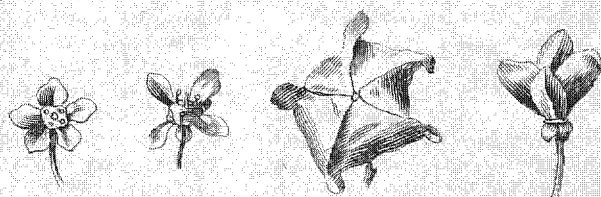
*Fig. 4. EVOLUTE.*



*Fig. 3. EXCENTRICITY.*



*Fig. 5. EUONYMUS, the SPINDLE-TREE.*





**EXLEGALITUS**, among lawyers, the same with an outlawed person. See the article **OUTLAW**.

**EX MERO MOTU**, a formula used in the king's charters and letters patent, signifying that he grants them of his own will and motion.

It is intended to bar all exceptions that might be taken to the charter or patent, by alledging the king, in granting them, was abused by false suggestions.

**EXOCATACOELI**, in church history, a general name by which several great officers in the church of Constantinople were called, as the grand master of the chapel, the grand steward, &c.

They were of great authority in public assemblies, and even had the precedence of bishops.

**EXACIONITES**, or **EXACIONITES**, names given to the Arians of the IXth century. See the article **ARIANS**.

**EXOCOETUS**, the **FLYING-FISH**, in ichthyology, constitutes a distinct genus of fishes of the malacopterygious or soft-finned order; it has ten small bones in the membrane of the gills the pectoral fins are extremely long, and situated just below the extremity of the covering of the gills on the sides, but elevated towards the back: they almost equal the whole body of the fish in length, which greatly resembles an herring, both in shape and colour. See plate **XCIV**. fig. 1.

It is caught in the Mediterranean, and other seas, and is called by different authors *exocætus*, *exochinus*, *hirundo piscis*, and *mugil alatus*.

When pursued by any fish of prey, it throws itself into the air, where it not only suspends itself, but moves very nimbly forward by means of its long fins, so long as they continue wet.

**EXODIARY**, *exodiarius* in the ancient roman tragedy, was the person who after the drama or play was ended, sung the exodium. See the article **EXODIUM**.

**EXODIUM**, in the ancient greek drama, one of the four parts or divisions of tragedy, being so much of the piece as included the catastrophe and unravelling of the plot, and answering nearly to our fourth and fifth acts. See **EPILOGUE**.

**EXODIUM**, among the Romans, consisted of certain humorous verses rehearsed by the *exodiarius* at the end of the *Fabulæ Atellanæ*.

**EXODIUM**, *ἐξόδιον*, in the septuagint signifies the end or conclusion of a feast. Par-

ticularly it is used for the eighth day of the feast of tabernacles, which, it is said, had a special view to the commemoration of the Exodus, or departure out of Egypt.

**EXODIUM** was also the name of a song sung at the conclusion of a feast.

**EXODUS**, a canonical book of the old Testament; being the second of the pentateuch, or five books of Moses.

It is so called, from the greek *ἐξ ὁδου*, going out, or departure of the children of Israel from the land of Egypt; the history of which is delivered in this book, together with the many miracles wrought on that occasion.

**EX OFFICIO**, among lawyers, signifies the power a person has, by virtue of his office, to do certain acts without being applied to. Thus a justice of peace may *ex officio*, at his discretion, take surety of the peace, without complaint made by any person whatsoever.

There was formerly an oath *ex officio*, whereby a supposed offender was compelled in the ecclesiastical court to confess, accuse, or clear himself of a crime; but this law is repealed.

**EXOMPHALUS**, *ἐξ ομφαλου*, in surgery, called also *omphalocele*, and *hernia umbilicalis*, is a preternatural tumor of the abdomen at the navel from a rupture, or distension of the parts which invest that cavity. These ruptures differ by their size and figure, some being small, especially when recent, others large and sometimes monstrous. Some are of a round figure, others acuminate, and Heister mentions an *exomphalos* in a woman with child, which resembled the size and figure of the penis.

Umbilical ruptures are again distinguished according to their contents, as if from the intestines, *enteromphalocele*; from the omentum *epi-omphalocele*; and if from air or wind, *pneumatomphalocele*: Some of these tumours are again distinguished by their consistence into hard or soft, returnable or not, painful or incarcerated.

An *exomphalos* arises from various causes; but the immediate cause is always some force exerted upon the abdomen, especially near the navel, such as a violent and sudden motion, a fall, a violent blow, or leap, strong coughing or sneezing, straining to lift great weights, difficult labour in women, &c. by which causes the peritonæum at the navel is either dilated, or as it sometimes

happens, entirely broke off. The method of cure is twofold, according as the intestines are returnable into the abdomen or not. If the first can be practised, it should be done without any delay, and the parts secured against a future relapse by a girdle or bandage. But if the intestine cannot be returned through the straitness of the aperture in the peritonæum, and the patient is tortured with violent pain in the part affected, with vomiting, and other bad symptoms, to apply the bandage in that case would not only be useless, but pernicious: the patient should rather be treated with emollient clysters and cataplasms, to relax the parts and facilitate their return; and if he is inclined to be feverish, it may then be proper to bleed, as in other inflammatory distempers, by which means the distended vessels of the intestine will be contracted, and probably afterwards returned by a gentle pressure of the hands, to be then secured with compress, bandage, and a proper instrument. If the disorder becomes still worse, after bleeding and the use of other medicines, the surgeon should then proceed to the operation, which consists chiefly in dilating the wound of the abdomen so as to make it large enough to return the intestine: for this purpose he makes a transverse incision through the integuments, and if the tumour be large, a crucial incision, taking great care not to injure the intestine; then the peritonæum, which immediately invests the intestine, may be dilated with as small an incision as possible, and the intestine afterwards returned into the abdomen. See the article HERNIA.

**EXONERATIONE SECTÆ**, in law, a writ which formerly lay, to free the king's ward from all suit to courts. See the article **WARD**.

**EXORCISM**, *εξορκισμός*, among ecclesiastical writers, the expelling devils from persons possessed, by means of conjurations and prayers. See **CONJURATION**. Exorcism makes a considerable part of the superstition of the church of Rome, the rituals of which forbid the exorcising any person without the bishop's leave.

The ceremony is performed at the lower end of the church, towards the door. The exorcist first signs the possessed person with the sign of the cross, makes him kneel, and sprinkles him with holy water. Then follow the litanies, psalms, and prayer; after which the exorcist asks the devil his name, and adjures him by the

mysteries of the christian religion, not to afflict the person any more: then, laying his right hand on the dæmoniac's head, he repeats the form of exorcism, which is this: "I exorcise thee, unclean spirit, in the name of Jesus Christ: tremble, O satan! thou enemy of the faith, thou foe of mankind, who hast brought death into the world, who hast deprived men of life, and hast rebelled against justice; thou seducer of mankind, thou root of evil, thou source of avareice, discord and envy."

The romanists likewise exorcise houses and other places, supposed to be haunted by unclean spirits; and the ceremony is much the same with that for persons possessed.

**EXORCISTS**, in church-history, an order of men, in the antient church, whose employment it was to exorcise or cast out devils. See the preceding article.

**EXORDIUM**, in rhetoric, is the preamble or beginning, serving to prepare the audience for the rest of the discourse.

Exordiums are of two kinds, either just and formal, or vehement and abrupt. The last are most suitable on occasions of extraordinary joy, indignation, or the like.

All exordiums should be composed with a view to captivate the good will, or attract the attention of the audience. The first may be done by paying them some compliment: thus St. Paul, *I think myself happy, king Agrippa, because I shall answer for myself this day before thee, touching all the things whereof I am accused of the Jews, especially because I know thee to be expert in all customs and questions which are among the Jews.*

Attention is procured by promising to treat some weighty, useful, pleasant, or surprising subject: and thus Horace, Ode i. lib. 3.

*Favete linguis: carmina non prius  
Audita, musarum sacerdos,  
Virginibus puerisque canto.*

The requisites in an exordium are, 1. Propriety, whereby it becomes of a piece with the subject, and matches it as a part does a whole: in this the Greeks were very defective. 2. Modesty, which very much recommends the orator to the favour of his audience. And, 3. Brevity, not amplified or swelled with a detail of circumstances.

The style should not be too much raised, nor should it run into bombast: and, above all things, the vain-glory should be

be avoided of that author, who, according to Horace, began his poem thus, *Fortunam Priami cantabo & nobile bellum*. See the article **PROPOSITION**.

It was forbidden to make exordiums in the areopagus at Athens, as it is an indirect and imperceptible manner of prepossessing the audience.

**EXORMISTOS**, in ichthyology, a name given to the petromyzon, or lampern.

**EXOS**, the same with the huso, or ising-glass fish. See the article **HUSO**.

**EXOSTOSIS**, in surgery, a preternatural eminence or excrescence of a bone, whether attended with an erosion or not.

When an exostosis is attended with no bad symptoms, it is best to let it alone, as the remedy will be worse than the disease. But if it occasions great deformity, impedes any action, or produces pain or other mischiefs, it may be removed in the manner directed under the article **SPINA VENTOSA**.

**EXOTIC**, an appellation denoting a thing to be the produce of foreign countries.

Exotic plants of the hot climates are very numerous, and require the utmost attention of the gardener to make them thrive with us. See the articles **STOVE** and **GREEN-HOUSE**.

**EXPANSION**, among metaphysicians, denotes the idea we have of lasting distance, all whose parts exist together.

**EXPANSION**, in physiology, the swelling or increase of the bulk of bodies when heated. See the article **HEAT**.

Dr. Halley found boiling water to expand one twenty-sixth part of its former bulk; but with a moderate heat, its expansion was imperceptible. Mercury, with a very gentle heat, expanded one seventy-fourth of its usual bulk, when cold. Spirit of wine, with a heat much less than that of boiling water, expanded itself to a twelfth part of its bulk, when cold, and then fell a boiling and emitting bubbles copiously. Mr. Boyle, in his book *Of Cold*, tells us, he found the expansion of water by freezing to be about a tenth part of a space more than the water usually takes up. See **FREEZING**.

Dr. Gregory shews, that if a globule of air, only one inch in diameter, had so great an expansion as it would have at a semi-diameter of the earth from its surface, it would fill all the planetary regions; as far as, and even beyond the sphere of Saturn. See the article **AIR**.

But besides fluids, the most solid bodies are expanded by heat, though not in the

inverse ratio of their specific gravities or cohesion, nor even in the ratio compounded of both. The degree of expansion seems rather to depend on the different arrangement, magnitude, and figure of their component parts. According to professor Muschenbroek, the expansions of metals in the same degree of heat, are as follows, *viz.* silver 78, iron 80, copper 89, brass 110, tin 153, lead 155. As to the time of their beginning to expand, it is found to be in the following order, *viz.* tin first, then lead, silver, brass, copper, and, last of all, iron; the reason of which is thought to depend upon the different structures of their pores, and their being more or less fitted to admit the influence of the fire.

For the expansion of the metalline rods of pendulums, and how remedied. See the article **PENDULUM**.

**EXPANSUM FOLIACEUM**. See the article **FOLIACEUM**.

**EX PARTE**, a term used in the court of chancery, where a commission is taken out and executed by one side or party only, upon the other party's neglecting or refusing to join therein.

When both the parties proceed together, it is called a joint commission.

**EX PARTE TALIS**, a writ that lies for a bailiff or receiver, that having auditors assigned to pass his accounts, cannot procure from them reasonable allowance, but is cast into prison; in which case the practice is to sue this writ out of the chancery, directed to the sheriff to take the four mainpernors to bring his body before the barons of the exchequer, at a certain day, and to warn the lord to appear at the same time.

**EXPECTANT**, in law, signifies having relation to, or depending on: thus, where land is given to a man and his wife, and to their heirs, they have a fee simple estate; but if it be given to them and the heirs of their bodies begotten, they have an estate tail, and a fee expectant, which is opposed to fee simple.

**EXPECTATIVE**, in the canon-law, an expectation grounded on the promise of having the next benefice that shall become vacant; or a right to the reversion of the next benefice. See **BENEFICE**.

**EXPECTATIVE GRACES**, *gratie expectative*, bulls antiently given by the popes, for obtaining some benefices that should become vacant.

These bulls were very mortifying to bishops, because they encroached on their

their privileges: besides, they were odious as they induced people to wish the death of others. The council of Trent annulled all expectatives; but the canons relating thereto were never admitted in France, where the right of conferring expectative graces is one of the king's prerogatives.

**EXPECTORANTS**, in pharmacy, medicines which promote expectoration. See the next article.

These medicines are very numerous: the most considerable in the vegetable kingdom are the roots of elecampane, arum, florentine orris, and liquorice; the herbs paul's betony, chervil, scabious, mouse-ear, germander, hyssop, and tarragon; the flowers of violets, mallows, red poppies, and saffron; the seeds of anise and fennel; the bark of cassiafras; and among resinous gums, benjamin and gum aminoniac: among fruits, raisins, figs, jujubes, and pine-kernels: honey, liquorice-juice, and oil of sweet almonds: among animal substances, sperma ceti and fats: among mineral substances, sulphur, together with its flowers and milk: among compound substances, the anisated spirit of sal ammoniac, the lohoch sanum, the syrup prepared of the lungs of a fox, the pectoral elixir, and the asthmatic spirit of Michaeli.

**EXPECTORATION**, the act of evacuating or bringing up phlegm, or other matters out of the trachea, lungs, &c. by coughing, haiking, spitting, &c. in order to which there are four things necessary; 1. That the matter contained there, be moveable and penetrable, so that its most fluid parts may not be dissipated, and the matter that remains become viscid, tough, and inextricable. 2. That the passages may be opened and lubricated. 3. That the matter be provoked to excretion. 4. That the stuffed vessels may be at rest, so as to become capable of relaxation; for if they are continually irritated, the moisture will be always thrown out of the glands of the aspera arteria with a sense of pain. See the preceding article.

**EXPEDITE**, in the forest-law, signifies to cut out the balls of a great dog's feet, belonging to people near the forest, for the preservation of the king's game: yet the ball of the foot of a mastiff is not to be cut out, but only the three claws of the fore foot.

Every person keeping a dog that is not expedited, forfeits 3 s. 4 d.

**EXPENDITORS**, the persons who disburse or expend the money collected by

the tax for repairs of sewers, after the same is paid into their hands by the collectors, as ordered by the commissioners, and for which they are to render accounts when required.

**EXPENSIS LITIS**, *COSTS of suit*. See the article *COSTS*.

**EXPENSIS MILITUM LEVANDIS**, a writ antiently directed to the sheriff, for levying the allowance for knights of the shire; and, *Expensis militum non levandis*, was a writ to hinder the sheriff from levying such allowance upon lands that held in antient demesne.

**EXPERIENCE**, a kind of knowledge acquired by long use, without any teacher. Mr. Locke says, that men receive all the materials of knowledge from experience and observation. See the article *IDEA*. Experience then consists in the ideas of things we have seen or read, which the judgment has reflected on, to form itself a rule or method.

Chauvinus enumerates three kinds of experience; the first is the simple use of the external senses, whereby we perceive the phenomena of natural things, without any direct attention thereto, or making any application thereof. The second is when we premeditatedly and designedly make trials of various things, or observe those done by others, attending to all the effects and circumstances. The third is that preceded by a foreknowledge, or, at least, an apprehension of the event, and determines whether the apprehension were true or false.

**EXPERIMENT**, in philosophy, is the trial of the result or effect of the applications and motions of certain natural bodies, in order to discover something of their motions and relations, whereby to ascertain some of their phenomena, or causes. See the article *EXPERIMENTAL PHILOSOPHY*.

*Torricellian EXPERIMENT*. See the article *TORRICELLIAN*.

**EXPERIMENTAL PHILOSOPHY**, that philosophy which proceeds on experiments, which deduces the laws of nature, and the properties and powers of bodies, and their actions upon each other, from sensible experiments and observations. The business of experimental philosophy is to enquire into and to investigate the reasons and causes of the various appearances or phenomena of nature, and to make the truth or probability thereof of obvious and evident to the senses, by plain, undeniable, and adequate experiments,

riments, representing the several parts of the grand machinery and agency of nature.

In our enquiries into nature, we are to be conducted by those rules and maxims which are found to be genuine, and consonant to a just method of physical reasoning; and these rules of philosophizing are by the greatest master in science, sir Isaac Newton, reckoned four; which are as follows:

1. More causes of natural things are not to be admitted, than are both true, and sufficient to explain the phænomena; for nature does nothing in vain, but is simple, and delights not in superfluous causes of things.

2. And, therefore, of natural effects of the same kind, the same causes are to be assigned, as far as it can be done: as of respiration in man and beasts, of the descent of stones in Europe and America, of light in a culinary fire and in the sun, and of the reflection of light in the earth and in the planets.

3. The qualities of natural bodies which cannot be increased or diminished, and agree to all bodies in which experiments can be made, are to be reckoned as the qualities of all bodies whatsoever: thus, because extension, divisibility, hardness, impenetrability, mobility, the vis inertiae, and gravity are found in all bodies which fall under our cognizance or inspection, we may justly conclude they belong to all bodies whatsoever, and are therefore to be esteemed the original and universal properties of all natural bodies.

4. In experimental philosophy, propositions collected from the phænomena by induction, are to be deemed (notwithstanding contrary hypotheses) either exactly or very nearly true, till other phænomena occur, by which they may be rendered either more accurate, or liable to exception. This ought to be done, lest arguments of induction should be destroyed by hypotheses.

These four rules of philosophizing are premised by sir Isaac Newton to his third book of the Principia; and more particularly explained by him in his Optics, where he exhibits the method of proceeding in philosophy, the first part of which is as follows.

As in mathematics, so in natural history, the investigation of difficult things, by way of analysis, ought always to precede the method of composition. This ana-

lysis consists in making experiments and observations, and in drawing general conclusions from them by induction (*i.e.* reasoning from the analogy of things by natural consequence) and admitting no objections against the conclusions, but what are taken from experiments or certain truths. And although the arguing from experiments and observation, by induction, be no demonstration of general conclusions, yet it is the best way of arguing which the nature of things admits of, and may be looked on as so much the stronger, by how much the induction is more general; and if no exception occur from phænomena, the conclusion may be pronounced generally; but if at any time afterwards, any exception shall occur from experiments, it may then be pronounced with such exceptions: by this way of analysis we may proceed from compounds to ingredients, and from motions to the causes producing them; and, in general, from effects to their causes; and from particular causes to more general ones, till the argument ends in the most general: this is the method of analysis. And that of synthesis, or composition, consists in assuming causes, discovered and established as principles, and by them explaining the phænomena, proceeding from them, and proving the explanations. See ANALYSIS, SYNTHESIS, SUBSTANCE, ELEMENT, WATER, VAPOUR, &c.

**EXPERIMENTUM CRUCIS**, a capital, leading, or decisive experiment; thus termed, either on account of its being like a cross, or direction post, placed in the meeting of several roads, guiding men to the true knowledge of the nature of that thing they are enquiring after; or, on account of its being a kind of torture, whereby the nature of the thing is as it were extorted by force.

**EXPIATION**, a religious act, by which satisfaction, atonement, or amends is made for the commission of some crime, the guilt done away, and the obligation to punishment cancelled.

The method of expiation, among the Jews, was chiefly by sacrifice, whether for sins of ignorance, or to purify themselves from certain pollutions; as a woman after child-birth, a leper after cleansing, &c. See the articles SACRIFICE and PURIFICATION.

*Great day of EXPIATION*, an annual solemnity of the Jews, upon the tenth day of the month Tisri, which answers to our September,

September. On this occasion the high priest laid aside his breast-plate and embroidered ephod, as being a day of humiliation. He first offered a bullock and a ram for his own sins, and those of the priests; then he received from the heads of the people two goats for a sin-offering, and a ram for a burnt offering, to be offered in the name of the whole multitude. It was determined by lot which of the goats should be sacrificed, and which set at liberty. After this he perfumed the sanctuary with incense, and sprinkled it with blood: then, coming out, he sacrificed the goat, upon which the lot had fallen. This done, the goat, which was to be set at liberty, being brought to him, he laid his hands upon its head, confessed his sins, and the sins of the people, and then sent him away into some desert place: it was called azazel, or the scape-goat. See the article *SCAPE-GOAT*.

As to the expiations among the heathens, they were of several kinds, as sacrifices and religious washings.

**EXPIATION**, in a figurative sense, is applied by divines to the pardon procured to mens sins, by the merits of Christ's death.

**EXPIATION**, among civilians, the carrying off, or sequestering, something belonging to an inheritance, before the heir had intermeddled therewith.

**EXPIATION** also denoted a robbery committed by night, and so called from the robbers stripping people of their cloaths.

**EXPIRATION**, in phisic, that part of respiration whereby the air is expelled, or driven out of the lungs. See the article *RESPIRATION*.

**EXPIRATION**, in chemistry, is applied to all sorts of evaporation, and subtile effluvia, that go off into the air.

**EXPIRATION** is also used for the end of any term agreed upon. It likewise signifies death.

**EXPLEES**, or *ESPLEES*, in law. See the article *ESPLEES*.

**EXPLICITE**, in the schools, something clear, distinct, formal, and unfolded.

**EXPLOSION**, in phisics, is properly applied to the going off of gun-powder and the report made thereby. Hence it is used to express such sudden actions of bodies, as generate air instantaneously: thus, half a dram of carraway-seed, poured upon a dram of the compound spirit of nitre, in an empty receiver, produces such a prodigious quantity of air as to blow up with an explosion a receiver of six inches

in diameter and eight inches deep; the pressure, therefore, of the atmosphere on the exhausted receiver, which it overcomes, is above 400 lb reckoning 15 lb to a square inch. From the experiments in Mr. Robins's New Principles of Gunnery, it appears, that the force of fired gun-powder, at the instant of its explosion, is the same as that of an elastic fluid of a thousand times the density of common air. See *GUN-POWDER*.

**EXPONAS VENDITIONE**. See the article *VENDITIONE*.

**EXPONENT**, in algebra, is a number placed over any power or involved quantity, to shew to what height the root is raised: thus, 2 is the exponent of  $x^2$ , and 4 the exponent of  $x^4$ , or  $xxxx$ .

We have observed, under the article *DIVISION*, in algebra, that the rule for dividing powers of the same quantity, is to subtract the exponents, and make the difference the exponent of the quotient; if, therefore, a lesser power is divided by a greater, the exponent of the quotient must, by this rule, be negative: thus,

$$\frac{a^4}{a^6} = a^{4-6} = a^{-2}. \text{ But } \frac{a^4}{a^6} = \frac{1}{a^2}; \text{ and}$$

hence  $\frac{1}{a^2}$  is expressed by  $a^{-2}$ , with a ne-

gative exponent. It is also obvious that

$$\frac{a}{a} = a^{1-1} = a^0; \text{ but } \frac{a}{a} = 1, \text{ and there-}$$

fore  $a^0 = 1$ . After the same manner,

$$\frac{1}{a} = \frac{a^0}{a} = a^{0-1} = a^{-1}; \quad \frac{1}{aa} = \frac{a^0}{aa} =$$

$$a^{0-2} = a^{-2}; \quad \frac{1}{aaa} = a^{0-3} = a^{-3};$$

so that the quantities,  $a, 1, \frac{1}{a}, \frac{1}{a^2}, \frac{1}{a^3},$

$\frac{1}{a^4},$  &c. may be expressed thus,  $a^1, a^0,$

$a^{-1}, a^{-2}, a^{-3}, a^{-4},$  &c. These are called the negative powers of  $a$ , which have negative exponents; but they are at

the same time positive powers of  $\frac{1}{a}$ , or

$a^{-1}$ . See the articles *POWER* and *INVOLUTION of quantities*.

**EXPONENT of a ratio**, is the quotient arising from the division of the antecedent by the consequent: thus, in the ratio of 5 to 4, the exponent is  $1\frac{1}{4}$ ; but the exponent of 4:5, is  $\frac{4}{5}$ .

If the consequent be unity, the antecedent itself is the exponent of the ratio: thus the exponent of the ratio 4:1 is 4.

Wherefore

Wherefore the exponent of a ratio is to unity as the antecedent is to the consequent. Altho' the quotient of the division of the antecedent by the consequent is usually taken for the exponent of a ratio, yet in reality the exponent of a ratio ought to be a logarithm. And this seems to be more agreeable to Euclid's definition of duplicate and triplicate ratios, in his fifth book. For 1, 3, 9, are continual proportionals; now if  $\frac{1}{3}$  be the exponent of the ratio of 1 to 3, and  $\frac{2}{9}$  or  $\frac{1}{3}$  the exponent of the ratio of 3 to 9; and  $\frac{1}{9}$  the exponent of the ratio of 1 to 9; and since, according to Euclid, if three quantities be proportional, the ratio of the first to the third is said to be the duplicate of the ratio of the first to the second, and of the second to the third; therefore according to this,  $\frac{1}{9}$  must be the double of  $\frac{1}{3}$ , which is very false. But it is well known, the logarithm of the ratio of 1 to 9, that is, the logarithm of 9, is the double of the ratio of 1 to 3, or 3 to 9, that is the logarithm of 3. From whence it appears that logarithms are more properly the exponents of ratios, than numerical quotients; and Dr. Halley, Mr. Cotes, and others, are of the same opinion.

EXPONENT is also used in arithmetic, in the same sense as index or logarithm. See INDEX and LOGARITHM.

EXPONENTIAL CALCULUS. See the article CALCULUS EXPONENTIALIS.

EXPONENTIAL CURVE, is that whose nature is expressed by an exponential equation. The area of any exponential curve whose nature is expressed by this exponential equation  $x^x = y$  (making  $1 + v$

$$= x) \text{ will be } \frac{1}{0.1.2} v^2 + \frac{1}{0.1.2.3} v^3 -$$

$$\frac{1}{0.1.2.3.4} v^4 + \frac{1}{0.1.2.3.4.5} v^5 -$$

$$\frac{1}{0.1.2.3.4.5.6} v^6, \text{ \&c. See the article } \text{CALCULUS EXPONENTIALIS.}$$

EXPONENTIAL EQUATION is that wherein there is an exponential quantity. See the next article.

EXPONENTIAL QUANTITY is a quantity whose power is a variable quantity, as  $x^x$ ,  $a^x$ . Exponential quantities are of several degrees and orders, according as the exponents themselves are more or less involved. If the exponent be a simple quantity, as  $x^y$ , it is called an exponen-

tial of the first or lowest degree; but when the exponent itself is an exponential of

the first degree, as  $x^x$  it is called an exponential of the second degree. In like manner, if the exponent itself be an ex-

ponential of the second degree, as  $x^{x^2}$ , it is called an exponential of the third degree, &c.

EXPORTATION, the shipping and carrying out of the kingdom wares and commodities, for other countries.

Exportation is part of foreign commerce, distinguished by the appellation active or selling part, in opposition to importation, which is called the passive, or buying part. Belloni observes, that commerce, when active, must produce a vast flow of riches, the ballance being always received in money; whereas, if it be passive, the most immense treasures will be soon exhausted, as the ballance of trade must be continually made good out of the remaining coin. Hence plenty of money in any place, implies that the quantity of goods exported far exceeds that of goods imported; and wherever we see money scarce, we may conclude that greater quantities of goods have been imported than exported. See the articles COMMERCE, MONEY, and EXCHANGE.

EXPOSITION, in general, denotes the setting a thing open to public view: thus it is the romaniſts say, the host is exposed, when shewn to the people.

EXPOSITION of children, among the antients, a barbarous custom of laying down children by the sides of highways, and other places most frequented, where they were left at the mercy of the public, and must unavoidably perish, unless taken up and educated by charitable and compassionate persons.

Many exposed their children merely because they were not in a condition to educate them; and as for those who exposed them for other reasons, they commonly did it with jewels, with a view no doubt to encourage those who found them to take care of their education if alive, or give them human burial, if dead.

EXPOSITION, in a literary sense, the explaining an author, passage, writing, or the like, and setting their meaning in an obvious and clear light.

Exposition of deeds, of all kinds, ought to be according to the true intent thereof, and reasonable and equal. See DEED.

**EXPOSITOR**, or **EXPOSITORY**, a title given to small dictionaries, serving to explain the hard words of a language.

**EX POST FACTO**, in law, something done after another: thus an estate granted may be good by matter *ex post facto*, that was not so at first, as in case of election.

**EXPOSTULATION**, in rhetoric, a warm address to a person, who has done another some injury, representing the wrong in the strongest terms, and demanding redress.

**EXPOSURE**, in gardening, the situation of a garden, wall, or the like, with respect to the points of the compass, as south or east. According to Mr. Miller, the best aspect or exposure for walls, in England, is to have one point to the east-ward of the south; by reason these will enjoy the benefit of the morning sun, and be less exposed to injuries from the west and south-west winds, than walls directly facing the south. The next best aspect is due south, and the next to that south-east, which is preferable to the south-west, for the reasons before assigned. However, as there will, for the most part, be south-west and west walls in every garden, these may be planted with such sorts of fruit as do not require so much heat to ripen them; and wherever there are north walls, they are only fit for baking-pears and plums, morello-cherries for preserving, or some duke-cherries may be thus continued longer in the season. See **GARDEN**, **PLANTING**, &c.

**EXPRESS**, something that is determinate and precise, or in such formal terms as leaves no room for doubt.

**EXPRESS** also denotes a courier. See the article **COURIER**.

**EXPRESSED OILS**, in chemistry, such oils as are obtained from bodies only by pressing. See the article **OIL**.

**EXPRESSED SPECIES**. See **SPECIES**.

**EXPRESSION**, in chemistry, or pharmacy, denotes the act of expressing out the juices or oils of vegetables, which is one of the three ways of obtaining them; the other two being by infusion and decoction.

Oils obtained by means of fire, are called stillatitious.

**EXPRESSION**, in rhetoric, the elocution, diction, or choice of words in a discourse. Beautiful expression is the natural and true light of our thoughts: it is to this we owe all the excellencies in discourse; which gives a kind of vocal life and spirit. As the principal end of discourse is to be understood, the first thing we should

endeavour to obtain, is a richness of expression, or habit of speaking so well as to make our thoughts easily understood. See **STYLE**, **TROPE**, **RHETORIC**, &c.

**EXPRESSION**, in painting, a natural and lively representation of the subject, or of the several objects intended to be shewn.

The expression consists chiefly in representing the human body and all its parts, in the action suitable to it: in exhibiting in the face the several passions proper to the figures, and observing the motions they impress on the external parts. See the article **ATTITUDE**.

The term expression is frequently confounded with that of passion, but they differ in this, that expression is a general term, implying a representation of an object agreeably to its nature and character, and the use or office it is to have in the work; whereas passion, in painting, denotes a motion of the body, accompanied with certain dispositions or airs of the face, which work an agitation in the soul: so that every passion is an expression, but not every expression a passion.

*The laws of EXPRESSION.* Expression being a representation of things according to their character, may be considered either with respect to the subject in general, or to the passions peculiar thereto.

First, with respect to the subject, it is to be observed, 1. That all the parts of the composition are to be transformed or reduced to the character of the subject, so as they may conspire to impress the same sentiment, passion, or idea. 2. In order to this, if any circumstance occur in history or description, that would avert or take from the idea, it must be suppressed, unless essential to the subject. 3. To this end the history or fable is to be well studied in the authors who describe it, in order to conceive its nature and character truly, and impress it strongly on the imagination, that it may be diffused and carried through all the parts of the subject. 4. A liberty may be taken, to choose favourable incidents, in order to diversify the expression, provided they are not contrary to the principal image of the subject, or the truth of history. 5. The harmony of the *tout ensemble* ought to be particularly regarded, both with respect to the actions and the light and colour. See **CLARO-OBSCURO**. 6. The modes and customs are to be observed, and every thing made conformable to time, place, and quality. 7. The three unities of time, place, and action ought



to be observed; that is, nothing should be represented in the same picture, but what is transacted or passes at the same time, and may be seen at the same view.

Secondly, with respect to the particular passions and affections of the subject, the rules are, 1. That the passions of brutes be few and simple, and have almost all an immediate respect either to self-preservation or the propagation of the species: but in the human kind there is a greater variety, and accordingly more marks and expressions thereof. 2. Children not having the use of reason, act much after the same manner as brutes, and express the motions of their passions directly, and without fear or disguise. 3. Though the passions of the soul may be expressed by the actions of the body, it is in the face they are generally shewn, and particularly in the turn of the eye, and motions of the eye-brows. 4. There are two ways of lifting up the eye-brows, the one at the middle, which likewise draws up the corners of the mouth, and argues pleasant motions; the other at the point next the nose, which draws up the middle of the mouth, and is the effect of grief or sadness. 5. The passions are all reducible to joy and sadness, each of which is either simple, or mixed and passionate. 6. Joy causes a dilatation of the parts: the eye-brows rise in the middle; the eyes half open, and smiling; the pupil sparkling, and moist; the nostrils a little open; the cheeks full; the corners of the mouth drawn a little upwards; the lips red; the complexion lively; the forehead serene. 7. Passionate joy, proceeding from love, shews the forehead smooth and even, the eye-brows a little elevated on the side the pupil is turned to, the eyes sparkling and open, the head inclined towards the object, the air of the face smiling, and the complexion ruddy. That proceeding from desire shews itself by the body, the arms extending towards the object in uncertain and unquiet motions. 8. Simple sadness is expressed by the body being cast down, the head carelessly hanging aside, the forehead wrinkled, the eye-brows raised to the middle of the forehead, the eyes half-shut, and the mouth a little open, the corners downwards, the under lip pointing and drawn back, the nostrils swelled and drawn downwards. That mixed with fear causes the parts to contract and palpitate, the members to tremble and fold up, the visage to be pale

and livid, the point of the nostrils elevated, the pupil in the middle of the eye, the mouth opened at the sides, and the under lip drawn back. In that mixed with anger, the motions are more violent, the parts all agitated, the muscles swelled, the pupil wild and sparkling, the point of the eye-brows fixed to the nose, the nostrils open, the lips big and pressed down, the corners of the mouth a little open and foaming, the veins swelled, and the hair erect. That with despair resembles the last, only more excessive and disordered. 9. The hand has a great share in the expression of the sentiments and passions; the raising of the hands, conjoined, towards heaven, expresses devotion; wringing the hands, grief; throwing them towards heaven, admiration; fainting and dejected hands, amazement and despair; folding hands, idleness; holding the fingers indented, musing; holding forth the hands together, yielding and submission; lifting up the hand and eye to heaven, calling God to witness; waving the hand from us, prohibition; extending the right hand to any one, pity, peace, and safety; scratching the head, thoughtfulness; laying the hand on the heart, solemn affirmation; holding up the thumb, approbation; laying the fourth finger on the mouth, bidding silence; giving with the finger and thumb, a giving sparingly; and the fore-finger put forth and the rest contracted, to shew and point at, as much as to say, *this is he*. 10. The sex of the figure is to be regarded; and man, as he is of a more vigorous and resolute nature, ought to be expressed in all his actions freer and bolder than women, who are to be more reserved and tender. 11. So also as to the age, the different stages whereof incline to different motions both of body and mind. 12. The condition or honours a person is invested with, renders their actions more reserved, and their motions more grave, contrary to the populace, who observe little conduct or restraint, giving themselves up, for the most part, to their passions; whence their external motions become rude and disorderly. Lastly, in spirits, all those corruptible things must be retrenched, which served only for the preservation of life, as veins, arteries, &c. only retaining what may serve for the form and beauty of the body. In angels particularly, as symbolical figures, their offices and virtues are to be marked out, without any draught of sensual

fual passions, only appropriating their characters to their functions of powers, activity and contemplation, *Dict. Polygr.*

**EXPULSION**, in a general sense, the act of violently driving a person out of any city, society, &c.

**EXPULSION**, in medicine, the act whereby any thing is forcibly driven out of the place in which it is: thus we say, the expulsion of the fœtus in delivery. See the article **DELIVERY**.

**EXPURGATION**, in astronomy, a term used by some authors for emersion. See the article **EMERSION**.

**EXQUIMA**, in zoology, a species of guinea monkey, of a reddish brown, spotted with white on the upper part of the body, and the under part white, with a beard of a beautiful snow-white colour. See the article **MONKEY**.

**EXTASY**, a transport which suspends the function of the senses, by the intense contemplation of some extraordinary or supernatural object, or when God impresses on the imagination the extraordinary ideas of any thing he would reveal.

**EXTASY**, in medicine, a species of catalepsy, when a person perfectly remembers, after the paroxysm is over, the ideas he conceived during the time it lasted. In an extasy there must be an unusual tension of the sensory, as is common in deliriums, &c.

**EXTEND**, in law, signifies to value the lands or tenements of a person bound by a statute, &c. who has forfeited the same, at such an indifferent rate, that by the yearly rent the creditor in time may be paid his debt. See **EXTENT**.

**EXTENDI FACIAS**, a writ to extend lands, &c. See the preceding article.

**EXTENSION**, in philosophy, one of the common and essential properties of body, or that by which it possesses or takes up some part of universal space, which is called the place of that body. See the articles **BODY** and **SPACE**.

Extension is threefold, 1. Either into length only, and then it is called a line. Or, 2. Into length and breadth, which is called a superficies. Or, 3. Into length, breadth, and depth, which is called a solid; being the three dimensions according to the quantity of which the magnitude or bulk of bodies are estimated. See **LINE**, **SUPERFICIES**, and **SOLID**.

Extension, according to Mr. Locke, is space considered between the extremities of matter, which fills up its capacity with something solid, tangible, and

moveable. Space, says that philosopher, may be conceived without the idea of extension, which belongs to body only.

**EXTENSION of fractured limbs**, in surgery, ought to be performed in the following manner: 1. The patient is to be kept firm and steady. The posture of body to be observed at this time differs, according to the circumstances of the case; sometimes the patient should sit, either upon a stool, or upon the floor. 2. An assistant should support the limb with his hands, both above and below the fractured part. 3. The assistant, who holds the lower part of the limb, should extend it strongly and equally, till the fractured bone can be replaced: if his hands alone are not sufficient to make the required extension, he must use a cord, or rather a napkin: if one man has not strength enough for this office, there must be two or more employed.

You must be careful not to use too great roughness in this operation, lest you give your patient unnecessary pain. If the tumour and inflammation is come on before the extension, it is best to defer it till these symptoms are removed. When the fractured bones maintain their natural situation, you are under no necessity of extending or replacing the limb; but when the fractured parts recede from each other, some degree of extension is necessary, which must be always suited to the distortion of the limb: the greater distance there is between the extremities of the divided parts of the bone, so much shorter will the limb be, from the contraction of the muscles; therefore the extension in this place ought to be so much the greater. See the article **FRACTURE**.

The extension in luxated bones is to be performed much in the same manner with that in fractures, viz. the outer or lower part of the dislocated limb is to be extended till the head of the disordered bone be reduced exactly into the sinus from whence it was luxated.

**EXTENSOR**, an appellation given to several muscles, from their extending or stretching the parts to which they belong: such are, 1. The common extensor of the fingers, which has its origin at the external condyle of the humerus, and the posterior part of the radius and ulna: it afterwards divides into four tendons, which pass under the ligament of the carpus, and terminate in the posterior surface of all the phalanges of the fingers, where they are gibbous. 2. The exten-

(or

for of the thumb, called also bicornis and tricornis, arises in the posterior and middle part of the radius and ulna, and terminates in two or three tendons in the first, second, and third phalanx of the thumb. 3. The proper extensors of each finger, which are a part of, or at least have their origin with the common extensor. 4. The long extensor of the toes, which has its origin in the upper part of the tibia, and in the anterior part of the ligament, between the tibia and fibula: it afterwards divides into five tendons, four of which are inserted into the four phalanges of the toes, and the fifth into the outer metatarsal bone. 5. The short extensor of the toes, arises from the upper part of the calcaneum, and dividing into tendons, is inserted into the toes.

Besides these, there are proper extensors of the toes; also the long and short extensors of the great toe, and the common extensor of the back and loins, which is divided into three. If these act only on one side, they draw the parts obliquely sideways.

**EXTENT**, in law, is used in a double sense; sometimes it signifies a writ or command to the sheriff for the valuing of lands or tenements; and sometimes the act of the sheriff, or other commissioner, upon this writ: but most commonly it denotes an estimate or valuation of lands; and hence come our extended or rack-rents. See the article **EXTEND**.

Every extent ought to be made on inquisition and verdict, without which the sheriff cannot legally execute the writ.

The cognizee, or party to whom the lands are delivered, has no absolute property in them, but is accountable to the cognitor according to the extended value only, not the real value. No seisin can be on an extent, nor may lands or goods be sold thereon.

**EXTERIOR**, or **EXTERNAL**. See the article **EXTERNAL**.

**EXTERMINATION**, in general, the extirpating or destroying something.

In algebra, surds, fractions, and unknown quantities are exterminated by the rules for reducing equations. See the article **EQUATION**.

We have two curious theorems in Mr. Maclaurin's algebra, for exterminating unknown quantities of given equations; and here it is proper to observe, that he calls all the coefficients, prefixed to the same unknown quantity, coefficients of

the same order: such are  $a, d, g$ , in the theorem 2. as being prefixed to the same quantity  $x$ : such also are  $b, e, h$ ; and  $c, f, k$ . But he calls those opposite coefficients, that are taken each from a different equation, and from a different order of coefficients, as  $a$  and  $e$ , and  $d$  and  $b$ , in the first theorem; and  $a, e, k$ ;  $a, h, f$ ; and  $d, b, k$ , in the second theorem.

**Theorem 1.** Suppose two equations given involving two unknown quantities, as

$$\begin{cases} ax + by = c \\ dx + ey = f \end{cases} \text{ then shall } y = \frac{af - dc}{ae - db}.$$

Where the numerator is the difference of the products of the opposite coefficients, in the orders in which  $y$  is not found; and the denominator is the difference of the products of the opposite coefficients, taken from the orders that involve the unknown quantities. For from the first equation it appears that  $ax = c - by$ ,

$$\text{and } x = \frac{c - by}{a}; \text{ and from the second}$$

$$\text{equation, that } dx = f - ey, \text{ and } x = \frac{f - ey}{d}.$$

$$\text{Therefore, } \frac{c - by}{a} = \frac{f - ey}{d}; \text{ and } cd - dby = af - aey, \text{ whence } aey - dby = af - cd; \text{ and } y = \frac{af - cd}{ae - db}. \text{ Q. E. D.}$$

To exemplify this theorem, suppose  $a = 5$ ,  $b = 7$ ,  $c = 100$ ,  $d = 3$ ,  $e = 8$ , and  $f = 80$ .

$$\text{Then } y = \frac{5 \times 80 - 3 \times 100}{5 \times 8 - 3 \times 7} = \frac{100}{19} = 5 \frac{5}{19};$$

$$\text{and } x = \frac{240}{19} = 12 \frac{12}{19}.$$

**Theorem 2.** Suppose now that there are three unknown quantities,  $x, y, z$ , and three equations: thus,

$$\begin{cases} ax + by + cz = m \\ dx + ey + fz = n \\ gx + hy + kz = p \end{cases} \text{ Then shall } z =$$

$$\frac{aep - abn + dbm - dbp + gbn - gem}{aek - afb + dbc - dbk + gbj - gec}.$$

Where the numerator consists of all the different products that can be made of three opposite coefficients, taken from the orders in which  $z$  is not found; and the denominator consists of all the products that can be made of the three opposite coefficients, taken from the orders that involve the three unknown quantities. For from the last it appears,

$$\text{that } y = \frac{an - afx - dm + dcx}{ae - db}, \text{ and } y =$$

$$y = \frac{ap - akz - gm + gcz}{ab - gb}; \text{ therefore}$$

$$\frac{an - afz - dm + dcx}{ae - db} = \frac{ap - akz - gm + gcz}{ab - gb}$$

$$\text{and } \frac{an - afz - dm + dcx \times ab - gb \times}{an - afz + gbdm - gbdcx} = \frac{ap - gm}{-akz + gcz \times ae - db \times ap - akz + gbdm - gbdcx}.$$

Then transposing and dividing will be found  

$$z = \frac{aep - abn + dbm - dbp + gbn - gem}{aek - ahf + dbc - dbk + gbj - gec}.$$
  
 The values of  $x$  and  $y$  are found after the same manner, and have the same denominator: *ex. gr.*

$$y = \frac{afp - akn + dkm - dep + gcn - gfm}{aek - ahf + dbc - dbk + gbj - gec}.$$

If any term is wanting in any of the three given equations, the values of  $x$  and  $y$  will be found more simple. Thus, suppose that  $f$  and  $k$  are equal to nothing, then the term  $fz$  will vanish in the second equation, and  $kz$  in the third; and

$$z = \frac{aep - abn + dbm - dbp + gbn - gem}{-dbc - gec}$$

$$\text{and } y = \frac{gcn - dep}{-dbc - gec}.$$

If four equations are given, involving four unknown quantities, their values may be found much in the same manner, by taking all the products that can be made of four opposite coefficients, and always prefixing contrary signs to those that involve the products of two opposite coefficients: See the articles COEFFICIENT and EQUATION.

**EXTERNAL**, or **EXTERIOR**, a term of relation applied to the surface or outside of a body; or that part which appears or presents itself to the eye, touch, &c. in contradistinction to internal. See the article INTERNAL.

**EXTERNAL MEDICINES**, the same with local or topical medicines. See the articles TOPICAL and LOCAL.

The senses are also divided into external, being those whereby we perceive ideas, or have the perception of external objects, as seeing, hearing, &c. and internal. See the article SENSE.

**EXTERNAL** is also used to signify any thing that is without-side a man, or that is not within himself, particularly in his mind, in which sense we may say external objects, &c.

The existence of an external world, that is, of bodies and objects out of the mind, was absolutely denied by Dr. Berkely. See the article EXISTENCE.

**EXTERNAL ANGLES**, are the angles on the outside of any right-lined figure, when all the sides are severally produced, and they are all, taken together, equal to four right angles. See the article ANGLE.

**EXTERNAL EAR**. See the article EAR.

**EXTINCTION**, in general, denotes the putting out or destroying something, as a fire or flame. See FIRE and FLAME.

Various engines have been contrived for extinguishing accidental fires, for which see ENGINE and WATER-BOMB.

**EXTINCTION**, in chemistry, is when a metal, mineral, &c. after having been heated red hot, is plunged into some fluid; either to soften and temper its acrimony, as tutty in rose-water; or to communicate its virtue to the liquor, as iron or steel to common water, &c.

**EXTINGUISHMENT**, in law, is a consolidation or union, as where one has due to him a yearly rent out of lands, and afterwards purchases the lands out of which the rent arises: in this case, both the property and the rent being united in one possessor, the rent is said to be extinguished. Likewise where a person has a lease for years, and he afterwards buys the property of what is leased, the lease becomes thereby extinguished.

There is, however, a difference on purchasing part of the lands, and the several sorts of rents: thus if a person has a rent-charge granted to him and his heirs, issuing out of land, and he purchases any part of that land to him and his heirs; as this rent is entire, and issuing out of every part of the land, the whole rent-charge is extinguished. Yet if such person has a rent-service, and he does purchase part of the lands where-out it issues, this shall not extinguish all the rent, but only for the land purchased.

**EXTINGUISHMENT of common**, is by purchasing all the lands which have interest therein: also if a commoner releases his common in one acre, it is an extinguishment of the whole; but where he aliens part of his lands, to which the common belongs, the common is not extinguished thereby, but shall be divided.

**EXTINGUISHMENT services**. If the lord purchases or accepts any part of the tenancy, out of which an entire service is to be paid, the service becomes thereby extinct; unless it be for the public good,

or homage and fealty, which are not subject to extinguishment.

**EXTINGUISHMENT** of *ways*, is where a person has a highway as appendant, and he makes a purchase of the land in which the way is, then the way is extinct: tho' it is held, that a way of necessity, to a market or church, is not so.

**EXTIRPATION**, the same with extermination. See **EXTERMINATION**.

**EXTIRPATIONE**, in law, a judicial writ that lies against a person, who, after a verdict found against him for land, &c. maliciously overthrows a house, or extirpates any trees upon it.

**EXTISPEX**, in antiquity, the person who drew prefaces from viewing the entrails of animals offered in sacrifice. See the articles **SACRIFICE**, **HARUSPEX**, and **DIVINATION**.

**EXTORTION**, in law, is an illegal manner of wresting any thing from a man either by force, menace, or authority. It is also the exaction of unlawful usury, winning by unlawful games, and taking more than is due under pretence of right, as excessive tolls in millers, &c.

At the common law, extortion is punishable by fine and imprisonment; and the statute of 3 Eliz. 1. c. 30. has enacted, that officers of justice guilty of extortion for the expedition of business, &c. shall render to the party treble value. There are likewise divers other statutes for punishing extortions of sheriffs, bailiffs, gaolers, clerks of the assize and of the peace, attornies, solicitors, &c.

**EXTRA**, a latin preposition signifying *without*, and used in composition with other words, as for instance, 1. *Extra-judicial*, where judgment is given in a cause that is not depending in the court where the same passed; or whereon the judgment has no jurisdiction. 2. *Extra-parochial*, which is said of places out of the bounds of any parish, or freed from the duties of a parish. The greatest part of the forests in England are extra-parochial.

**EXTRACT**, in pharmacy, is a solution of the purer parts of a mixed body inspissated, by distillation or evaporation, nearly to the consistence of honey. Extracts may be made almost of every part of the *materia medica*, or from any medicine, whether simple or compound, that is suited to give a tincture to any menstruum, in which it is customarily infused. They make a principal part of

modern pharmacy, and with great reason too; for the different elements of many compound bodies have qualities and powers, when separate and pure, which they are incapable of exerting when their force is suppressed by the quantity, or counteracted by the repugnant qualities of other species wherewith they are conjoined, as in the instances of acid spirits, testaceous earths, calces of metals, gums or resins of vegetables, and many others. The directions given by the college of physicians for making extracts, are these.

Take the matter from which the extract is to be prepared, cut, bruise, or otherwise manage it, as its nature requires, for infusion. Pour upon it spirit of wine, or any distilled waters, most accommodated to the prescriber's intention. Let it continue in infusion in a bath, or any other slow heat, for two days, or more, according as the hardness or softness of the matter requires, until the liquor is impregnated with the tincture of the thing infused. Then let the tinged liquor be separated by inclination, pouring on a fresh menstruum, infusing and separating, as before, as long as any tincture can be obtained. Let all the tinctures be put together and filtered through a paper, and then in a bath-heat evaporate the humidity, until the matter left is of the consistence of honey, which must be kept for use. And to this extract, for the sake of preserving it moist, may be added some portion of salt, or some other thing suitable to the main intention.

The most remarkable extracts of the London dispensatory are, 1. Extracts of the roots of elecampane, gentian, black hellebore, of the leaves of rue and savine, 2. Extract of liquorice. 3. Of logwood. 4. Of peruvian bark, both soft and hard. 5. Of lignum vitæ, both soft and hard. 6. Of jalap. And, 7. The cathartic extract which is prepared from proof spirit poured upon a proper quantity of succotrine aloes, the pith of coloquintida, scammony, and the lesser cardamom-seeds husked.

The thebaic extract consists only of opium dissolved in water, strained and evaporated to a consistence. Let it be remarked, that all watery extracts should be moistened or sprinkled with a little spirit of wine, to prevent their growing mouldy.

**EXTRACT**, in matters of literature, is something copied or collected from a book or paper.

**EXTRACTS** of writings or records, are notes upon them. See **ESTREAT**.

**EXTRACTA CURIÆ**, are the issues or profits of holding a court arising from the customary dues, fees and amercedments.

**EXTRACTION**, in chemistry and pharmacy, the operation by which essences, tinctures, &c. are drawn from natural bodies. See the article **EXTRACT**.

**EXTRACTION**, in surgery, is the drawing any foreign matter out of the body by the hand, or by the help of instruments. In extracting arrows and such like bearded weapons used by barbarous nations, the whole business consists in drawing out the head, so as that its protuberant beard or hooks may not wound and lacerate the contiguous parts. If it appears to be lodged but superficially under the integuments, it will be best to draw it out the same way it entered, provided the wound be first sufficiently dilated by incision, in order to prevent the laceration of the adjacent parts: otherwise it must be thrust forwards, and drawn out in the direction of its point in the opposite side, if possible, an incision being first made to meet it. This last method is most eligible, when the weapon has descended very deep; so that there is much less space for it to pass onward, than to be drawn back again; and also when it has passed beyond any large blood-vessels or nerves, so that it would induce a laceration of them to draw it back.

In extracting foreign bodies from the ear, you must first be informed by the account of the patient, and by searching with a probe, of what nature the offending body is; and if it happen to be a lump of dried indurated wax, it will be proper to inject some warm milk, or oil of olives or almonds, ordering the patient to hold his head inclined on the contrary side while you use the syringe. If a small calculus, &c. be lodged in it, you must first of all relax and mollify the passages of the ear, and then carefully extract the body with a probe or pliers. But if the foreign body should happen to be a pea, bean, or other grain, which is too much swelled by the humours to be discharged intire by the probe, or other instrument, you must break it with pliers, or cut it with small scissars, and extract it bit by bit. Sometimes an insect gets into the ear, and by struggling to get loose from the glutinous ear-wax, excites an into-

lerable pruritus and tickling, which in time turns to acute pain. When the insect can be perceived, it may be drawn out by a probe, &c. but if that fails, you must inject warm oil, or spirit of wine, which will quickly kill the insect, and then you may wash it out with the same or some other liquor, and afterwards cleanse the cavity of the ear with a bit of cotton or lint upon the end of your probe.

To extract bodies fallen into the eyes, the first and most easy method is by agitating and extending the eye-lids with one's fingers, holding the head down at the same time, by which means the increased flux of tears excited by the velli-cating body, very often washes it out of the eye without much difficulty. But if this method does not succeed, the next remedy is to blow some levigated pearl or crab-claws through a quill under the eye-lid, that as these are washed out by tears, they may also take the foreign body with them, otherwise the surgeon must take the small round head of a slender probe, or the end of a tooth-pick, and extending the eye-lids gently from the eye, carefully extract the offending body. Lime or any acrid salt may be washed from the eyes by a pencil brush of soft feathers, or a bit of fine sponge fastened in a quill, dipped in warm water.

The method of extracting small bones of fish, needles, pins, &c. sticking in the fauces or gula, is as follows. When the offending body cannot be removed by taking a large draught of some liquor, or swallowing a large mouthful of bread, &c. recourse must be had to some instrument. The tongue is first to be depressed with a spatula, in order to observe whether the obstacle can be seen; and if it appears near the upper part of the oesophagus, it should be cautiously extracted with a pair of pliers, or some such instrument. But if it is lodged deep in the oesophagus, the surgeon may then give the patient a piece of sponge to swallow, that has first been dipt in oil, and well fastened to a strong cord, by which it is to be pulled up again, after it has been swallowed by the patient as far as it will go; by which means the body sticking in the oesophagus, will be either forced down into the stomach, or else drawn up into the mouth.

For the extraction of bullets, &c. from wounds. See **GUN-SHOT wounds**.

**EXTRACTION**,

**EXTRACTION**, in genealogy, implies the stock or family from which a person is descended.

**EXTRACTION of roots**, in algebra and arithmetic, the method of finding the root of any power or number. See the articles **ROOT**, **SQUARE**, **CUBE**, &c.

The reader will perceive by the articles involution and power, that the extraction of roots, or the resolving of powers into their roots, is the reverse of involution, and consequently that the roots of single quantities are easily extracted by dividing their exponents by the number that denominates the root required; for the powers of any root are found by multiplying its exponent by the index that denominates the power; and therefore, when any power is given, the root must be found by dividing the exponent of the given power by the number that denominates the kind of root that is required. Thus the square root of  $a^8$  is  $a^{\frac{8}{2}} = a^4$ ; and the square root of  $a^4 b^8 c^2$ , is  $a^2 b^4 c$ . The cube root of  $a^6 b^3$ , is  $a^{\frac{6}{3}} b^{\frac{3}{3}} = a^2 b$ ; and the cube root of  $x^9 y^6 z^{12}$ , is  $x^3 y^2 z^4$ . It will also appear from what we shall say of involution, that any power that has a positive sign, may have either a positive or negative root, if the root is denominated by an even number. Thus the square root of  $+a^2$  may be  $+a$  or  $-a$ , because  $+a \times +a$  or  $-a \times -a$  gives  $+a^2$  for the product. But if a power have a negative sign, no root of it denominated by an even number can be assigned, since there is no quantity that multiplied into itself an even number of times can give a negative product. Thus the square root of  $-a^2$  cannot be assigned, and is what we call an impossible or imaginary quantity. See the article **ROOT**.

But if the root to be extracted is denominated by an odd number, then shall the sign of the root be the same as the sign of the given number whose root is required. Thus the cube root of  $-a^3$  is  $-a$ , and the cube root of  $-a^6 b^3$ , is  $-a^2 b$ . If the number that denominates the root required is a divisor of the exponent of the given power, then shall the root be only a lower power of the same quantity. As the cube root of  $a^{12}$  is  $a^4$ , the number 3 that denominates the cube root being a divisor of 12. But if the number that denominates what sort of root is required is not a divisor of the

exponent of the given power, then the root required shall have a fraction for its exponent: thus the square root of  $a^3$  is  $a^{\frac{3}{2}}$ , the cube root of  $a^5$  is  $a^{\frac{5}{3}}$ , and the square root of  $a$  itself is  $a^{\frac{1}{2}}$ . These powers that have fractional exponents, are called imperfect powers or surds, and are multiplied and divided, involved and evolved, after the same manner as perfect powers. Thus the square of  $a^{\frac{3}{2}}$  is  $a^2 \times \frac{3}{2} = a^3$ ; and the cube of  $a^{\frac{2}{3}}$  is  $a^2 \times \frac{2}{3} = a^{\frac{4}{3}}$ .

The square root of  $a^{\frac{2}{3}}$  is  $a^{\frac{2}{3} \times \frac{1}{2}} = a^{\frac{1}{3}}$ ; and the cube root of  $a^{\frac{4}{3}}$  is  $a^{\frac{4}{3} \times \frac{1}{3}} = a^{\frac{4}{9}}$ . See the article **SURD**.

The square root of any compound quantity, as  $a^2 + 2ab + b^2$ , is discovered after this manner. First take care to dispose the terms according to the dimensions of the alphabet, as in division; then find the square root of the first term  $aa$ , which gives  $a$  for the first member of the root. Then subtract the square from the proposed quantity, and divide the first term of the remainder  $2ab + b^2$ , by the double of that member, viz.  $2a$ , and the quotient  $b$  is the second member of the root. Add this second member to the double of the first, and multiply their sum  $2a + b$  by the second member  $b$ , and subtract the product  $2ab + b^2$  from the foresaid remainder  $2ab + b^2$ , and if nothing remains, then the square root is obtained.

The manner of the operation is thus:

$$\begin{array}{r} a^2 + 2ab + b^2 \quad (a + b \\ \underline{a^2} \phantom{+ 2ab + b^2} \\ (a + b) 2ab + b^2 \\ \underline{\times b) 2ab + b^2} \\ 0. \quad 0. \end{array}$$

But if there had been a remainder, you must have divided it by the double of the sum of the two parts already found, and the quotient would have given the third member of the root. Thus if the quantity proposed had been  $a^2 + 2ab + 2ac + b^2 + 2bc + c^2$ , after proceeding as above you would have found the remainder  $2ac + 2bc + c^2$ , which divided by  $2a + 2b$ , gives  $c$  to be annexed to  $a + b$ , as the third member of the root. Then adding  $c$  to  $2a + 2b$ , and multiplying their sum  $2a + 2b + c$  by  $c$ , subtract the product  $2ac + 2bc + c^2$  from the foresaid remainder; and since nothing now remains, you conclude that  $a + b + c$  is the square root required.

The operation is thus :

$$\begin{array}{r}
 a^2+2ab+2ac+b^2+2bc+c^2(a+b+c) \\
 \underline{a^2} \\
 2a+b)2ab+2ac+b^2+2bc+c^2 \\
 \times b)2ab \quad \quad +b^2 \\
 \hline
 2a+2b+c)2ac+2bc+c^2 \\
 \times c)2ac+2bc+c^2 \\
 \hline
 \text{o.} \quad \text{o.} \quad \text{o.}
 \end{array}$$

Another example. Required the square root of  $xx - ax + \frac{1}{4}aa$

$$\begin{array}{r}
 xx - ax + \frac{1}{4}aa(x - \frac{1}{2}a) \\
 \underline{xx} \\
 2x - \frac{1}{2}a) -ax + \frac{1}{4}aa \\
 \times -\frac{1}{2}a) -ax + \frac{1}{4}aa \\
 \hline
 \text{o.} \quad \text{o.}
 \end{array}$$

The square root of any number is found out after the same manner. If it is a number under 100, its nearest square root is found by the following table, by which also its cube root is found, if it be under 1000, and its biquadratic, if it be under 10000.

Root	1	2	3	4	5	6	7	8	9
Square	1	4	9	16	25	36	49	64	81
Cube	1	8	27	64	125	216	343	512	729
Biquad.	1	16	81	256	625	1296	2401	4096	6561

But if it is a number above 100, then its square root will consist of two or more figures, which will be found by different operations by the following rule. Place a point above the number that is in the place of units; pass the place of tens, and place again a point over that of hundreds; and go on towards the left hand, placing a point over every second figure, and by these points the number will be distinguished into as many parts as there are figures in the root. Then find the square root of the first part, and it will give the first figure of the root; subtract its square from that part, and annex the second part of the given number to the remainder. Then divide this new number (neglecting its last figure) by the double of the first figure of the root; annex the quotient to that double, and multiply the number thence arising by the said quotient; and if the product is less than your dividend, or equal to it, that quotient shall be the second figure of the root. But if the product is greater than the dividend, you must take a less number for the second figure of the root than that number. Much after the same manner may the other figures of the quo-

tient be found, if there are more points than two placed over the given number.

To find the square root of 99856, I first point it thus, 99856, then I find the square root of 9 to be 3, which therefore is the first figure of the root. I subtract 9 the square of 3 from 9, and to the remainder I annex the second part 98, and I divide (neglecting the last figure 8) by the double of 3 or 6, and I place the quotient after 6, and then multiply 61 by 1, and subtract the product 61 from 98. Then to the remainder 37, I annex the last part of the proposed number (56) and dividing 3756 (neglecting the last figure 6) by the double of 31, that is by 62, I place the quotient after, and multiplying 626 by the quotient 6, I find the product to be 3756, which subtracted from the dividend, and leaving no remainder, the exact root must be 316.

Examples.

$$\begin{array}{r}
 99856 \sqrt{316} \\
 9
 \end{array}$$

$$\begin{array}{r}
 61)98 \\
 \times 1)61
 \end{array}$$

$$\begin{array}{r}
 626)3756 \\
 \times 6)3756
 \end{array}$$

$$\begin{array}{r}
 \text{o}
 \end{array}$$

$$\begin{array}{r}
 27394756 \sqrt{5234} \\
 25
 \end{array}$$

$$\begin{array}{r}
 102)239 \\
 \times 2)204
 \end{array}$$

$$\begin{array}{r}
 1043)3547 \\
 \times 3)3129
 \end{array}$$

$$\begin{array}{r}
 10464)41856 \\
 \times 4)41856
 \end{array}$$

$$\begin{array}{r}
 \text{o}
 \end{array}$$

$$\begin{array}{r}
 529)23 \\
 4
 \end{array}$$

$$\begin{array}{r}
 43)129 \\
 \times 3)129
 \end{array}$$

$$\begin{array}{r}
 \text{o}
 \end{array}$$

In general, to extract any root out of any given quantity: first range that quantity according to the dimensions of its letters, and extract the said root out of the first term, and that shall be the first member of the root required. Then raise this root to a dimension lower by unit than the number that denominates the root required, and multiply the power that arises by that number itself; divide the second term of the given quantity by the product, and the quotient shall give the second member



member of the root required. Thus to extract the root of the fifth power out of  $a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$ , I find that the root of the fifth power out of  $a^5$ , gives  $a$ ; which I raise to the fourth power, and multiplying by 5, the product is  $5a^4$ ; then dividing the second term of the given quantity  $5a^4b$  by  $5a^4$ , I find  $b$  to be the second member; and raising  $a + b$  to the fifth power and subtracting it, there being no remainder, I conclude that  $a + b$  is the root required. If the root has three members, the third is found after the same manner from the

first two considered, as one member, as the second member was found from the first, which may easily be understood from what was said of extracting the square root.

In extracting roots, it will often happen that the exact root cannot be found in finite terms. Thus the square root of

$$a^2 + x^2 \text{ is found to be } a + \frac{x^2}{2a} - \frac{x^4}{8a^3} +$$

$$\frac{x^6}{16a^5} - \frac{5x^8}{128a^7} + \&c. \&c.$$

The operation is thus :

$$\begin{aligned} & a^2 + x^2 \left( a + \frac{x^2}{2a} - \frac{x^4}{8a^3} + \frac{x^6}{16a^5} - \&c. \right) \\ & \underline{2a + \frac{x^2}{2a}} \quad * + x^2 \\ & \quad \times \frac{x^2}{2a} = x^2 + \frac{x^4}{4a^2} \\ & \underline{2a + \frac{x^2}{a} - \frac{x^4}{8a^3}} \quad - \frac{x^4}{4a^2} \\ & \quad \times - \frac{x^4}{8a^3} = - \frac{x^4}{4a^2} - \frac{x^6}{8a^4} + \frac{x^8}{64a^6} \\ & \quad + \frac{x^6}{8a^4} - \frac{x^8}{64a^6}, \&c. \&c. \end{aligned}$$

After the same manner, the cube root of  $a^3 + x^3$  will be found to be  $a + \frac{x^3}{3a^2} -$

$$\frac{x^6}{9a^5} + \frac{5x^9}{81a^8} - \frac{10x^{12}}{243a^{11}} + \&c.$$

The reader will find a general theorem for extracting the root of any binomial under the article BINOMIAL.

The roots of numbers are to be extracted as those of algebraic quantities. Place a point over the units, and then place points over every third, fourth, or fifth figure towards the left hand, according as it is the root of the cube, of the fourth or fifth power that is required; and if there be any decimals annexed to the number, point them after the same manner, proceeding from the place of units towards the right hand. By this means the number will be divided into so many periods, as there are figures in the root required. Then enquire which is the greatest cube, biquadrate, or fifth power in the first period, and the root of that power will give the first figure of the root required. Subtract the greatest cube, biquadrate, or fifth power from the first period, and to the remainder annex the first figure of your second period, which

shall give your dividend. Raise the first figure already found to a power less by unit than the power whose root is sought, that is, to the second, third, or fourth power, according as it is the cube root, the root of the fourth, or the root of the fifth power that is required, and multiply that power by the index of the cube, fourth or fifth power, and divide the dividend by this product, and the quotient will be the second figure of the root required.

Raise the part already found of the root, to the power whose root is required; and if that power be found less than the two first periods of the given number, the second figure of the root is right; but if it be found greater, you must diminish the second figure of the root, till that power be found equal to or less than those periods of the given number. Subtract it, and to the remainder annex the next period, and proceed till you have gone through the whole given number; finding the third figure by means of the two first, as you found the second by the first, and afterwards finding the fourth figure (if there be a fourth period) after the same manner from the three first.

Thus to find the cube root of 13824, point it 13824 : find the greatest cube in 13, *viz.* 8, whose cube root 2 is the first figure of the root required. Subtract 8 from 13, and to the remainder 5 annex 8, the first figure of the second period ; divide 58 by triple the square of 2, *viz.* 12, and the quotient is 4, which is the second figure of the root required, since the cube of 24 gives 13824, the number proposed.

Operation.

$$\begin{array}{r} 13824(24 \\ 8=2 \times 2 \times 2 \\ \hline 3 \times 4=12)58(4 \\ \text{Subtract } 24 \times 24 \times 24=13824 \\ \hline \text{Rem. } 0 \end{array}$$

After the same manner the cube root of 13312053, is found to be 237.

Operation.

$$\begin{array}{r} 13312053(237 \\ 8=2 \times 2 \times 2 \\ \hline 12)53(4 \text{ or } 3 \\ \text{Subtract the cube of } 23=12167 \\ \hline 3 \times 23 \times 23=1587)11450(7 \\ \text{Subtract the cube of } 237=13312053 \\ \hline 0 \end{array}$$

In extracting of roots, after you have gone through the number proposed, if there is a remainder, you may continue the operation by adding periods of cyphers to that remainder, and find the true root in decimals to any degree of exactness required.

For the method of extracting the root of any affected equation. See the article *Quadratic EQUATION*, &c.

**EXTRACTOR**, in midwifery, an instrument, or forceps, for extracting children by the head. See *DELIVERY*.

**EXTRAVAGANTES**, those decretal epistles, which were published after the clementines. See *CLEMENTINES*.

They were so called because, at first, they were not digested, or ranged, with the other papal constitutions, but seemed to be, as it were, detached from the canon law. They continued to be called by the same name when they were afterwards inserted in the body of the canon law. The first extravagantes are those of John XXII. successor of Clement V. the last collection was brought down to the year 1483, and was called the common extravagantes, notwithstanding that

they were likewise incorporated with the rest of the canon law. See the article *DECRETAL*.

**EXTRAVASATION**, in contusions, fissures, depressions, fractures, and other accidents of the cranium, is when one or more of the blood-vessels that are distributed on the dura mater, is broke or divided, whereby there is such a discharge of blood as greatly oppresses the brain, and disturbs its offices ; frequently bringing on violent pains, and other mischiefs ; and at length, death itself, unless the patient is timely relieved. See the articles *CONTUSION*, *FISSURE*, and *FRACTURE*.

If the extravasated quantity of blood be ever so small, it will certainly corrupt, and affect the meninges, and the brain itself, with the same disorder : from hence will proceed violent inflammations, deliriums, ulcers, &c. and even death itself, sooner or later. And this will frequently be the case, after a violent blow upon the cranium, though the bone should escape without any injury. In this case the blood is spilt either between the cranium and dura mater, or between the dura mater and pia mater, or between the pia mater and the brain, or lastly, between the sinuses of the brain. Each of these cases are attended with great danger, but the deeper the extravasation happens, so much greater will the danger be. See the article *WOUND*. You may suspect that blood is extravasated in the cavity of the cranium, from the violence of the symptoms which succeed, if the patient lies still without sense or motion, if blood flows from the mouth or nose, if the eyes are much inflamed and swelled, if vomiting succeeds ; and when upon the remission of these symptoms the patient complains of a remarkable heaviness of the head, a sleepiness, vertigo, blindness, spasms, &c. When the quantity of extravasated blood is very considerable the patient dies on the spot.

If no fissure or contrafissure in the cranium, nor any external injury appear on the head after a violent blow, then, in order to find out in what part of the head the extravasation is seated, it will be proper to shave the head all over, and if no mark of a stagnation of blood appears, cover the head with an emollient plaster, laying over it medicated bags well heated, which will, in a few hours, produce

produce tumour, and softness upon the injured part. See the article **CONTRA-FISSURE**.

When the seat of the injury is discovered, the first intention is to discharge the extravasated blood, for which intent many advise the use of the trepan: but as that should not be attempted, unless in a case of absolute necessity, 'tis best to try first the use of attenuating and dividing medicines. See the articles **TREPAN** and **ATTENUANTS**.

With this intention, open a vein, and draw away as much blood as the strength of the patient will admit; prescribe a brisk purge, or sharp clysters; foment the head with medicated bags, and apply a melilot plaster to it; give frequently attenuating warm fluids: the operation of bleeding must be repeated, especially if the patient is young and athletic.

**EXTRAVASATION of blood betwixt the flesh and the skin**, in phlebotomy, the same with ecchymosis. See **ECCHYMOSES**.

**EXTREMES**, in logic, the terms expressing the two ideas whose relation we enquire after in a syllogism. See the article **SYLLOGISM**.

**EXTREME and mean proportion**, in geometry, is when a line *AB*, (plate **XCIV**. fig. 2.) is so divided in *F*, that the rectangle under the whole line *AB*, and the lesser segment *FB*, is equal to the square of the greater segment *AF*. Let a square be formed upon the line *AB*, and one of its sides *AC* be equally divided in the point *D*; draw *DB*, and take the line *DG* equal to the line *BD*; then the square *AGHF* will be equal to the rectangle *FE*.

For since the line *AC* is equally divided in the point *D*, and is lengthened by the line *AG*, the rectangle *CH*, together with the square of the line *AD*, will (by 6. 2. of each) be equal to the square of the line *DG* or *DB*. But the square *AE*, with the square of the line *AD*, is also equal (47. 1.) to the square of the line *DB*. Therefore the square *AE* is equal to the rectangle *CH*. Taking then away from both the rectangle *CF*, the rectangle *FE* will be equal to the square *FG*.

But no number can be so divided into two parts, as is well demonstrated by **Clavius**, in his commentaries upon lib. 9. of **Euclid**; which is evident enough thus: Let *a* be the number, and *x* the greater part; then the lesser part will

be *a - x*, and so  $aa - ax = xx$ , and thence  $x = \frac{a + a\sqrt{5}}{2}$ . and since the

square root of 5 cannot be had in numbers exactly, it is plain that the value of *x* partly consisting of the square root, multiplied by *a*, cannot be had exactly in numbers neither.

**EXTREME UNCTION**. See **UNCTION**.

**EXTREMUM clausit diem**, in law. See the article **DIEM**.

**EXTRINSIC**, among metaphysicians, is taken in various senses: sometimes it signifies a thing's not belonging to the essence of another; in which sense, the efficient cause and end of a thing are said to be extrinsic. Sometimes it signifies a thing's not being contained within the capacity of another; in which sense these causes are called extrinsic, which introduce something into a subject from without, as when a fire introduces heat. Sometimes it signifies a thing added or applied to another, in which sense accidents and adherents are said to be extrinsic to the subjects to which they adhere. Sometimes the vision is said to be extrinsic from some form which does not exist in that thing, but is adjacent to it, or by some means or other without it. See the article **INTRINSIC**.

**EXULCERATION**, in surgery. See the article **ULCER**.

**EXUVIÆ**, among naturalists, denote the cast off parts, or coverings, of animals, as the skins of serpents, caterpillars, and other insects. See the articles **SERPENT** and **CATERPILLAR**.

Mr. **Reaumur** is very particular in describing the manner in which the caterpillar tribe throw off, or extricate themselves from, their exuviae. See vol. i. of his **History of Insects**, and the article **CATERPILLAR**.

The crab, as is well known, can even throw off its limbs at pleasure, which are again replaced by new ones. See the articles **CANCER** and **CRAB**.

**EXUVIÆ** is also used for the remains of sea-animals, found fossil, and more properly called extraneous, or marine fossils. See the article **FOSFILLS**.

**EYE, oculus**, in anatomy, the organ of sight; or that part of the body, whereby visible objects are represented to the mind. With regard to the eyes, we are to observe first, their situation, which is in the upper part of the face, to the end that

we may be able to see at a greater distance than otherwise we could. Secondly, their figure, which, excepting for the internal parts, is globular; and thirdly, their colour, which in the human species is variable; some being black, others greyish, and others bluish. The parts which do not enter into the composition of the eye, but are destined for the assistance of seeing, are the eye-brows, the eye-lids, and the muscles of the eyes.

The eye-lids, *palpebræ*, are the integuments of the eyes: there are two of them to each, an upper, and an underlid; and, at their joining, there are formed two corners, called *canthi*, an interior and larger, and an exterior and smaller; they are capable of closing and opening at pleasure, by means of muscles. They are composed of the epidermis, the cutis, which is there very thin, and an arched cartilage, called the *tarsus* of the eye-lid; and are lined on the inner surface with a fine and delicate soft membrane, very sensible and continuous to the periorbteum, and to the *albuginea* of the eye.

The eye-lashes, *cilia*, are certain rigid hairs, situated on the arch or tarsus of the eyelids, and bent in a very singular manner; they are destined for keeping external bodies out of the eye, and for moderating the influx of light.

The *glandulæ sebaceæ* are situated in the interior surface of the eye-lids: they serve for the secretion of an oleaginous fluid, which is of great use in preventing the attrition of the eye-lids, from their continual motion. See the articles *SEBACEÆ GLANDULÆ*.

After this we observe the *caruncula lachrymalis*. See the article *CARUNCULA*.

The *glandula lachrymalis* is situated in the orbit, above the smaller angle, with its excretory ducts under the upper eyelid. See the article *LACHRYMALIS*.

The *puncta lachrymalia* are two. See the article *LACHRYMALIA PUNCTA*.

The use of the eye-lids is to cover and defend the eyes; to wipe off foulness from the cornea; to moderate the influx of light, at pleasure; and, by their frequent motion, to occasion a secretion of a necessary fluid from the glands.

The muscles of the eyes, serving to their motions, are in the human frame six in number: four straight, *viz.* the *attollens*, *deprimens*, *adductor*, and *ab-*

*ductor*; and two oblique, the superior and inferior. See the articles *MUSCLE* and *ATTOLLENS*, &c.

Between, and among these, there is a considerable quantity of fat serving for various very important purposes.

The proper parts of the eye, which form its globe, or bulb, are its coats, or tunics, the humours and the vessels.

The coats of the eye are several, 1. The *albuginea*, *adnata*, or *conjunctiva*. 2.

The *cornea*. 3. The *sclerotic*, in which what is called the *aquæducts* of Nuck are to be observed. 4. The *choroides*.

5. The *uvea*; wherein we are to observe,

1. Its anterior coloured surface, called the *iris*, which is intirely vascular, and from which arises the variety of colours in the human eyes. 2. The *pupil* or

*foramen*, which is round in the human eye, is nearly in the middle of the *iris*, and is capable of dilatation and

contraction. 3. Its posterior surface, which is black, and in which, when this blackness is cleared away, there appears

the sphincter of the pupil, formed of circular fibres for contraction; the ciliary

fibres, or processes for the dilatation of the pupil; the ciliary ligament for the

motion of the vitreous and crystalline humours; the arterial and venal circles,

from which the vessels are in a wonderful manner distributed over the *uvea*; the

*choroides*; the *ligamentum ciliare*; and the vitreous and crystalline humours;

the *ductus nigri*, so called from their black colour, placed between the processes and the *legamentum ciliare*; the

space between the *uvea* and the *cornea*, called the anterior camera of the eye;

and that between the *uvea* and the crystalline, called its posterior camera,

which is either much smaller or intirely wanting. Many authors have attributed

glands to the *uvea*, but they are very difficult to be distinguished, if there be

any. See the articles *ALBUGINEA*, *CORNEA*, *SCLEROTIC*, &c.

Finally, we are to mention the *retina*, which is a very delicate, tender, and,

as it were, mucous coat of the eye; or, more properly, it is only an expansion

of the optic nerve at the bottom of the eye: it is a primary part of the eye,

and the great organ of vision; for the sake of which all the rest were formed.

See the article *RETINA*.

The humours of the eye are generally established to be three; their office is to

serve

serve for the expansion of the coats, and for the refraction of the rays of light, they are distinguished by the name of aqueous, vitreous, and crystalline. See the articles **AQUEOUS**, **VITREOUS**, and **CRYSTALLINE**.

After these three humours of the eye, we observe the tunica arachnoides: this is an extremely thin and fine vasculous membrane, which furrounds the crystalline and the vitreous humour, and by the assistance of which the crystalline lens is lodged in the fovea of the vitreous humour. On the cutting or breaking of this membrane, the crystalline falls out.

The blood-vessels are next to be considered: these are distributed in an amazing manner through the internal parts of the eye. Arteries from the internal and external carotids go to the eye in many different parts. There are also numbers of extremely minute ones, which convey only a fine and subtle lymph thither, by which means the tunics and humours of the eye are nourished; the veins partly carry the blood back to the sinuses of the dura mater, and partly to the jugulars.

Besides these vessels, Valsalva assures us, that he discovered a number of true and proper lymphatics in the eye of an ox.

The nerves of the eye are very numerous: besides the optic nerve, which, by its expansion forms the retina, and enters the eye from the side of the nose, there are the third and fourth pair of the brain, and a fifth and sixth branch distributed about the muscles, membranes, eyelids, and lachrymal sacculus and gland. See the article **NERVE**.

*Motions of the EYE* are either external or internal. The external motion is that performed by its four straight and two oblique muscles, whereby the whole globe of the eye changes its situation or direction. The spherical figure of our eyes, and their loose connection to the edge of the orbit, by the tunica conjunctiva, which is soft, flexible and yielding, does excellently dispose them to be moved this, or the other way, according to the situation of the object we would view. By the membranes already described, the eye is connected to the edge of the orbit, which being soft and flexible, they do in such a manner, as not in the least to impede its necessary motions; and that great quantity of fat placed all round the globe, betwixt it

and the orbit, lubricates and softens the eye, and renders its motions more easy: hence arise the three following remarkable observations. 1. When nature has denied the head any motion, it is observable, that she has, with great care and industry, provided for this defect. To this purpose belongs the surprizing beautiful and curious mechanism observable in the immovable eyes of flies, wasps, &c. They nearly resemble two protuberant hemispheres, each consisting of a prodigious number of other little segments of a sphere, all which segments are perforated by a hole, which may be called their pupil, in which this is remarkable, that every foramen, or pupil, is of a lenticular nature, so that we see objects through them topsy-turvy, as through so many convex glasses: yea, they become a small telescope, when there is a due focal distance between them, and the lens of the microscope by which they are viewed. Leuwenhoek's observations make it probable, that every lens of the cornea supplies the place of the crystalline humour, which seems to be wanting in those creatures, and that each has a distinct branch of the optic nerve answering to it, upon which the images are painted, so that as most animals are binocular, and spiders for the most part octonocular, so flies, &c. are multocular, having in effect as many eyes as there are perforations in the cornea, by which means, as other creatures but with two eyes are obliged, by the contraction of the muscles above enumerated, to turn their eyes to objects, these have some or other of their pupils always ready placed towards objects nearly all around them: whence they are so far from being denied any benefit of this noble and most necessary sense of sight, that they have probably more of it than other creatures, answering to their necessities and ways of living.

II. As in man, and most other creatures, the eyes are situated in the head, because, among other reasons, it is the most convenient place for their defence and security, being composed of hard bones, wherein are formed two large, strong sinuses, or sockets, commonly called orbits, for the convenient lodging of these tender organs, and securing them against external injuries; so in those creatures whose head, like their eyes and the rest of their body, is soft and without bones, nature hath provided for this

this necessary and tender organ, a wonderful kind of guard, by enduing the creature with a faculty of withdrawing his eyes into his head, and lodging them in the same safety within his body. We have a very beautiful example of this in snails, whose eyes are lodged in four horns, like atramentous spots, one at the end of each horn, which they can retract at pleasure, when in any danger. Here it may be also observed, that the hardness of the cornea in all animals that want eyelids, as fishes, exactly resembles the horn of a lanthorn; and therefore is not hurt by such particles as their eyes are commonly exposed to. And in the mole, because this animal lives under ground, it was necessary its eyes should be well guarded and defended against the many dangers and inconveniencies to which its manner of living exposes it; this is the reason why its eyes are so small, and that they are situated so far in the head, and covered so strongly with hair; and besides they can protrude, and retract them at pleasure.

III. The third and last reflection we shall make upon the external motion of our eyes, is what regards a problem which has very much perplexed both physicians and philosophers, *viz.* What is the cause of the uniform motion of both eyes.

In some creatures, such as fishes, birds, and among quadrupeds, the hare, cameleon, &c. the eyes are moved differently; the one towards one object, and the other towards another. But in man, sheep, oxen, and dogs, the motions are so uniform, that they never fail to turn both towards the same place: hence in operations upon the eye that require it to be kept immoveable, sometimes it is necessary to tie up the sound eye with a compress, by which means the other is easier kept fixed and immoveable.

The final cause of this uniform motion is, 1. That the sight may be thence rendered more strong and perfect: for since each eye apart impresses the mind with an idea of the same object, the impression must be more strong and lively, when both eyes concur; and that both may concur, it is necessary that they move uniformly; for though the retina, or immediate object of vision, be expanded upon the whole bottom of the eye, as far as the ligamentum ciliare, yet nothing is clearly and distinctly seen,

but what the eye is directed to. 2. A second advantage we reap from the uniform motion of the eyes, which is more considerable than the former, consists in our being thereby enabled to judge with more certainty of the distance of objects. See the article VISION.

There is yet another advantage, full as considerable as any of the former, that is thought to arise from the uniform motion of our eyes, and that is, the single appearance of objects seen with both our eyes; which, though at first view it does not appear probable, is true: for if in looking at an object, you impress one of your eyes aside with your finger, and alter its direction, every thing will be seen double.

By the internal motions of the eye, we understand those motions which only happen to some of its internal parts, such as the crystalline and iris; or to the whole eye, when it changes its spherical figure, and becomes oblong or flat. The internal motions of our eyes are either such as respect the change of conformation, that is necessary for seeing distinctly, at different distances, or such as only respect the dilatation and contraction of the pupil.

That our eyes change their conformation, and accommodate themselves to the various distances of objects, will be evident to any person, who but reflects on the manner and most obvious phenomena of vision.

Authors are very much divided in their opinions with regard to the mechanism by which this change is introduced, as well as what parts it consists in: for some are of opinion, that the whole globe changes its form, by being lengthened into an oblong figure, when objects are near, and by becoming flat, when they are removed to a greater distance; and others are of a quite contrary opinion.

With regard to the change of the crystalline, and the mechanism by which it is produced, some maintain, that according as objects are at different distances, this humour becomes more or less convex, which does indeed very well account for distinct vision at all distances; for objects painted on a sheet of white paper, by means of a lens placed in the hole of a window-shutter, in a dark room, have their images always distinct, at whatever distance they be from the window, provided that the lens be of a convexity

convexity answerable to that distance. See the article *LENS*, &c.

Others again are of opinion that the crystalline never changes its figure, but that it is moved to and from the retina, according to the distance or proximity of the object in view, and this also does equally well account for the distinct appearance of objects at all distances, as is evident from the laws of optics. See the articles *VISION* and *OPTICS*.

*Diseases of the EYE* are, an ophthalmia, or inflammation of the eyes; the gutta serena, or amaurosis; a suffusion, or cataract; an ectropium; a glaucoma; an amblyopia, or obscurity of sight, containing the myopia, the presbytopia, the nyctalopia, and the amaurosis; the strabismus, or squinting; an unguis, pannus, or pterygium of the membrane of the eye; the albugo, leucoma, or spot in the eye; a fucillation of the eye; an epiphora, or rheum in the eyes, and the fistula lachrymalis. See each disease under its respective name.

*Atoms and flies appearing before the EYES.*

These images, or appearances, arise before the eyes from an obstruction of the optic nerve, from the fine fibres of the retina, or from the small veins contained therein, that is, they seem to be too much dilated, and are cured with difficulty; and especially if they are inveterate, because they are not seldom the forerunners of a gutta serena; in the beginning they may be cured with such things as open obstructions, especially those medicines mentioned in the cure of the gutta serena. See *GUTTA SERENA*.

*Defluxion on the EYE.* For a watery eye, if it arises from a weakness of the lachrymal gland, it will be proper to use strengtheners externally, as spirit of wine, Hungary water, spring water, fennel, or Valerian water, wherewith the parts adjoining are to be washed. Internally the abounding serum must be evacuated, or revulsed: if it be too sharp, it must be corrected by balsamics, and medicines against catarrhs, such as essence of amber, and decoction of the woods. The revulsion must be made by blisters and issues.

*Wounds in the EYES.* If the eye is wounded, but not so as to let out the vitreous or crystalline humour, the following method will be of great service. The wound should be anointed, two or three times in a day, with a feather, or fine rag, well dipped in unguentum alabastrinum;

and afterwards, a small compress laid over it, being well saturated with a collyrium, made of the whites of two eggs, two ounces and a half of rose water, half a drachm of oil of roses, and three grains of camphor, well mixed together. The bowels should also be kept loose for some days, with cooling and opening medicines: if the patient is of a plethoric habit, blood should be drawn from the neck or feet; all warm or sharp things should be thrown out of the patient's diet, and great care taken to keep him quiet. When the crystalline humour sticks in the orifice of the wound, it should be pulled out, that it may not bring on any deformity, or other mischief. When the vitreous and crystalline humours are fallen out of the eye, not only the sight but figure of the eye must be entirely destroyed, therefore, at first, it should be dressed with compresses dipped in warm wine, and afterwards with some vulnerary balsam.

*Contusions of the EYE.* When the eye is contused by any accident, it will be entirely deprived of sight, except the contusion is very small, and proper remedies are instantly applied. If the eye therefore has received a slight contusion, you may wash it frequently, for the first day, with cold spring water, covering it with linnen rags, wet with the same. On the next day, rub it externally with camphorated spirit of wine, covering it with stupps wrung out of vinous decoctions of eye-bright, speedwell, hyssop, sage, camomile - flowers, and fennel - seeds. If you cannot get these herbs, apply bolsters dipped in warm wine, renewing them often. If the contusion is large, or the patient of a plethoric habit, you must open a vein.

*To extract bodies fallen into the EYE.* See the article *EXTRACTION*.

*Scarification of the EYES.* See the article *SCARIFICATION*.

*Falling out of the EYE.* See the article *PROLAPSUS OCULI*.

*EYE-BROW.* See the article *BROW*.

*Artificial EYE,* a kind of camera obscura. See *CAMERA OBSCURA*.

*EYE,* in architecture, is used to signify any round window, made in a pediment, an attic, the reins of a vault, or the like.

*EYE of a dome,* an aperture at the top of a dome, as that of the Pantheon at Rome, or of St. Paul's at London: it is usually covered with a lanthorn.

**EYE of the volute**, in architecture, is the center of the volute, or that point in which the helix, or spiral of which it is formed, commences: or it is the little circle in the middle of the volute, in which are found the thirteen centers for the describing the circumvolutions of it.

**EYE-BROW**, in architecture, is used in the same sense as *list* or *fillet*. See **FILLET**.

**EYE**, in agriculture and gardening, signifies a little bud, or shoot, inserted into a tree, by way of graft.

**EYE of a tree**, a small pointed knot to which the leaves stick, and from which the shoots or sprigs proceed.

**EYE-BRIGHT**. See **EUPHRASIA**.

**EYE of a pear**, the extremity opposite to the stalk.

**EYE-FLAP**, in the manege, a little piece of leather, that covers the eye of a coach-horse.

**EYE of the branch of a bridle**, the uppermost part of the branch, which is flat, with a hole in it, for joining the branch to the head-stall, and for keeping the curb fast.

**EYE of a bean**, in the manege, a black speck or mark in the cavity of the corner-teeth, which is formed there about the age of five and a half, and continues till seven or eight. See **TEETH**.

**EYE of the anchor**, on board a ship, the hole wherein the ring of the anchor is put in to the shank.

**EYE of the strap**, on board a ship, the ring or round which is left of the strap to which any block is seized. See **STRAP**.

**EYE**, in printing, is sometimes used for the thickness of the types; or more properly, it signifies the graving in relief on the top of the letter, otherwise called its face: the eye of the *e* is the small opening at the head of that letter, which distinguishes it from the *c*.

**EYE**, among jewellers, is used for the lustre and brilliancy of precious stones, more commonly called the *water*. See **WATER**.

**Bull's EYE**, in astronomy, the same with *aldebaran*. See **ALDEBARAN**.

**EYE-GLASS**, in the microscope. See the article **MICROSCOPE**.

**Cat's EYE**, in natural history, the same with *asteria*. See the article **ASTERIA**.

**Crab's EYE**. See the article **CRAB'S EYES**.

**Goat's EYE**, the same with *ægias*. See the article **ÆCIAS**.

**Hare's EYE**. See **LAGOPHTHALMIA**.

**EYEMOUTH**, or **AYMOUTH**, a port-town of Scotland, about six miles north of Berwick.

**EYERY**, or **AIRY**. See **AIRY**.

**EYESS**, or **NYESS**, among sportsmen, denotes a young hawk just taken out of the nest, and not able to prey for herself. See the article **HAWK**.

**EYNDHOVEN**, a town of dutch Brabant, about fifteen miles south of Boisleduc.

**EYRAC**, or **IZACA-ARABIC**, a province of Asiatic Turkey, situated on the river Euphrates, being the antient Chaldea or Babylonia.

**EYRAC**, or **IRAC-AGEM**, the antient Parthia, now the principal province of Persia, is situated almost in the center of that kingdom, its capital city being Isfahan, the metropolis of the whole kingdom.

**EYRE**, or **EIRE**, in law, the court of itinerant justices. See **JUSTICES**.

**EYSENACH**, a city of Germany, in the circle of upper Saxony: east lon. 10° 12', and north lat. 51°.

**EZAN**, in the mahometan theology, a hymn containing the profession of their faith, which is repeated five times a day, to call the people to prayers.

**EZEKIEL**, a canonical book of the Old Testament, referring chiefly to the degenerate manners and corruptions of the Jews of those times.

It abounds with fine sentences and rich comparisons, and discovers a good deal of learning in profane matters.

Ezekiel was carried captive to Babylon with Jeconiah, and began his prophecies in the fifth year of the captivity. He was cotemporary with Jeremiah, who prophesied at the same time in Judea. He foretold many events, particularly the destruction of the temple, the fatal catastrophe of those who revolted from Babylon to Egypt, and the happy return of the Jews to their own land.

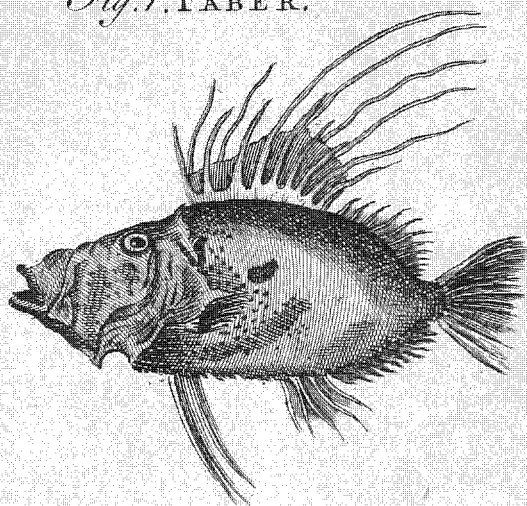
**EZEKIEL'S REED**, or **ROD**, a measure of length mentioned by that prophet, and computed to be nearly equal to two english feet.

**EZRA**, a canonical book of the Old Testament, comprehending the history of the Jews from the time of Cyrus's edict for their return, to the twentieth year of Artaxerxes Longimanus. It specifies the number of Jews who returned, and Cyrus's proclamation for the rebuilding the temple, together with the laying its foundation, the obstructions it met with, and the finishing thereof in the reign of Darius. The illustrious author of this book, was also the restorer and publisher of the canon of the Old Testament. See the articles **CANON** and **BIBLE**.





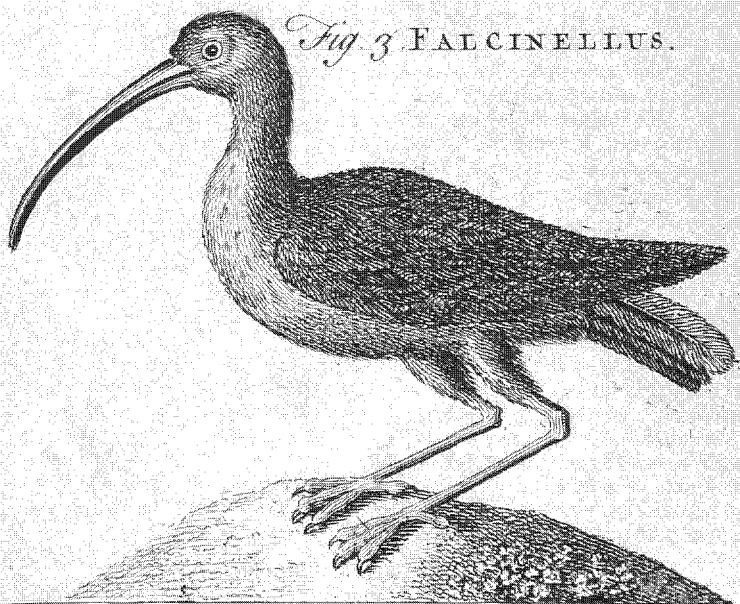
*Fig. 1. FABER.*



*Fig. 2. FAGONIA.*



*Fig. 3. FALCINELLUS.*



*T. Jefferys sculp.*

## F.

**F**, the sixth letter of the alphabet, and fourth consonant, is by some reckoned a mute, and by others a semi-vowel: it has much the same sound with the greek  $\phi$ , or *ph* in english words, and is only written in words of latin origin, *ph* being used instead of it in those derived from the Greek.

Suetonius tells us, that the emperor Claudius invented the *f*, and two other letters; and that it had the force of *v* consonant, and was wrote inverted *d*.

As a numeral, *F* denotes 40, and with a dash over it thus  $\bar{F}$ , 40000: in music, it stands for the bass clef; and frequently for *forte*, as *ff* does for *forte forte*. See the articles CLEF and FORTE.

*F*, in medicine, stands for *fiat*, let it be done: thus *F. S. A.* stands for *fiat secundum artem*, let it be done according to art.

As an abbreviation, *F* stands for *filius*, *fel-low*, and the like: thus *F. R. S.* signifies fellow of the royal society.

*FA*, in music, one of the syllables invented by Guido Aretine, to mark the fourth note of the modern scale, which rises thus, *ut, re, mi, fa*. See the articles NOTE and GAMUT.

Musicians distinguish two *fa*'s *viz.* the flat, marked with a *b*, or  $\flat$ ; and the sharp or natural, marked thus  $\sharp$ , and called bquadro. See BQUADRO.

*FA FINTO*, a feigned *F*, or a feint upon that note: this is the case of every note that has the mark  $\flat$  before it; but more especially *mi* and *fi*, or our *E* and *B*, and is what we commonly call the flat of any note. See the article FLAT.

*FABA*, the BEAN, in botany, is comprehended by Linnæus among the *vicæ*. See the articles VICIA and BEAN.

*FABA ÆGYPTIACA*, EGYPTIAN BEAN, a kind of nymphæa, the root of which is accounted stomachic and astrigent.

*FABA BENGALENSIS*, in the materia medica, a roundish compressed substance, about an inch in diameter, brought from Bengal, and thought to be a vitiated fruit of the myrobalans-kind. It is a very good astrigent, and therefore prescribed with great success in fluxes and hæmorrhages.

*FABA STI. IGNATII*, *ST. IGNATIUS'S* BEAN, in the materia medica, a dry and hard fruit, or rather kernel, prescribed with good success in vertigos, lethargies, epilepsies, asthmas, quartan agues, and worms, but should be used with great caution. It is given in powder, 10 or 12 grains being the dose, when intended to vomit the patient. In smaller quantities it acts as a sudorific. Its tincture is safe even for children, and is said to be one of the best medicines for their convulsions, and other disorders arising from obstructions of the primæ viæ.

*FABA PURGATRIX*, the fruit of a species of ricinus. See the article RICINUS.

*FABAGO*, in botany, the same with the zygophyllum. See ZYGOPHYLLUM.

*FABARIA*, in botany, a name given to the telephium or orpine. See TELEPHIUM.

*FABER*, in ichthyology, a fish of the zeus-kind, called in english doree, or john dory. See the article ZEUS.

It is distinguished from the other species of zeus by its prickly belly, and ragged appearance. Its usual length is from six to ten inches, and its breadth nearly half its length. See plate XCV. fig. 1.

*FABIANS*, *fabii*, in roman antiquity. See the article LUPERCALIA.

*FABLE*, *fabula*, a tale or feigned narration, designed either to instruct or divert, disguised under the allegory of an action, &c.

Fables were the first pieces of wit that made their appearance in the world, and have been still highly valued, not only in times of the greatest simplicity, but among the most polite ages of the world. Jotham's fable of the trees is the oldest that is extant, and as beautiful as any that have been made since. Nathan's fable of the poor man is next in antiquity, and had so good an effect as to convey instruction to the ear of a king. We find Æsop, in the most distant ages of Greece; and in the early days of the roman commonwealth, we read of a mutiny appeased by the fable of the belly and the members. As fables had their rise in the very infancy of learning, they never flourished more than when learning was at its greatest height; witness HORACE, Boileau, and Fontaine. See APOLOGUE.

**FABLE** is also used for the plot of an epic or dramatic poem, and is, according to Aristotle, the principal part, and, as it were, the soul of a poem. See the articles **DRAMA** and **EPIC**.

In this sense the fable is defined to be a discourse invented with art, to form the manners by instruction, disguised under the allegory of an action. Aristotle divides the fable into simple and compound: the simple having no change of fortune; and the compound having a turn from bad fortune to good, and from good to bad. The contrivance of each fable must have two parts, the intrigue and the discovery. The compound fable, according to Aristotle, pleases most, as having most variety.

Lord Bacon observes that the use of allegorical poetry is to envelope things, whose dignity deserves a veil, as when the secrets and mysteries of religion, policy, and philosophy are wrapped up in fables and parabols. Others are of opinion that fable is so essential to poetry, that there is no poetry without it; the fable being as much the form and distinction of a poem, as the figure is to a piece of marble to denominate it a statue. It is requisite towards the perfection of a fable, that it be admirable and probable: however admirable the fable is, it can have no effect if it is not probable; and probability alone is too faint and dull for poetry, as what is only admirable is too extravagant and dazzling. It is, therefore, of the utmost importance to be able to know how to mingle these in such a just temperament as may please the fancy, without shocking the reason. The admirable is all that which is against the ordinary course of nature; the probable is whatever suits with the common opinion: but the most part of poets, by too great a passion to create admiration, take not sufficient care to temper it with probability. Almost all the antient poets, however judicious otherwise, have been guilty of this fault, not to speak of the moderns.

**FABRIC**, in general, denotes the structure or construction of any thing; but particularly of buildings, as a church, hall, house, &c. See **BUILDING**.

**FABRIC-LANDS**, those formerly given towards rebuilding or repairing of cathedrals and other churches; for antiently almost every body gave more or less, by his will, to the fabric of the parish-church where he dwelt,

**FABULOUS**, something consisting of, or connected with a fable. See **FABLE**.

**FABULOUS AGE**, among antient historians. See the article **AGE**.

**FAC**, an abbreviation of *facciata*.

**FACADE**, in architecture. See **FACE**.

**FACCIATA**, among italian musicians, signifies a shortened page.

**FACE**, *facies*, or *vultus*, in anatomy, comprehends all that part of the head which is not covered with the common long hair. See the article **HEAD**.

Of the parts common to the whole face are, 1. The epidermis and cutis, or skin, the colour and fineness of which constitutes the principal beauty of the face. 2. The fat, which being in considerable quantity, and frequently covered with a fleshy pannicle, adds much to the beauty of the face. The parts proper to particular parts of the face are the muscles and bones, which are described in their proper places: besides which, we may likewise refer to the face, the organs of the senses of seeing, hearing, talking, and smelling. See the articles **EYE**, **EAR**, **NOSE**, **PALATE**, **MOUTH**, **TONGUE**, &c.

To these may be added the forehead, cheeks, temples, &c. See **FOREHEAD**, **CHEEKS**, &c.

The chin is nothing but the angle of the lower jaw, with its fleshy integuments. See the article **MAXILLA**.

**FACE**, or **FACADE**, in architecture, the front of a building, or the side which contains the chief entrance. Sometimes, however, it is used for whatever side presents to the street, garden, court, &c. or is opposite to the eye.

**FACE of a stone**, in masonry, that superficies of it which lies in the front of the work. The workmen generally choose to make one of those sides the face, which, when in the quarry, lay perpendicularly to the horizon, and consequently the breaking, not the cleaving way of the stone.

**FACE**, in fortification, an appellation given to several parts of a fortress, as the face of a bastion, &c. See **BASTION**.

The face of a place is the front comprehended between the flanked angles of two neighbouring bastions, being composed of a curtain, two flanks, and two faces; and is likewise called the *tenaille* of a place. In a siege, the attacks are carried on against both bastions, when the whole *tenaille* is attacked.

**Prolonged FACE**, that part of the line of defence-*razant*, which is between the angle of the shoulder and the curtain, or the

the line of defence-razant, diminished by the length of the face.

**FACE of a gun**, the superficies of the metal at the extremities of the muzzle of the piece.

**FACE**, in the military art, a word of command, intimating to turn about: thus, *face to the right*, is to turn upon the left heel a quarter-round to the right; and, *face to the left*, is to turn upon the right heel a quarter-round to the left.

**FACE of plants**, among botanists, signifies their general appearance, which, being nearly the same in plants of the same genus, serves to distinguish them at first sight. See **BOTANY**, **PLANT**, &c. The same term, *face*, *facies*, is used by other naturalists to denote the like resemblance among other objects, as fishes, birds, &c. However, it is proper to remark, that this resemblance is too fallacious to serve as a general character; since things, belonging to very different genera, are sometimes found to be very like each other in external appearance.

**FACET**, or **FACETTE**, among jewellers, the name of the little faces or planes to be found in brilliant and rose diamonds. See the article **DIAMOND**.

**FACETANUS LACERTUS**, the same with the tarantula. See **TARANTULA**.

**FACIA**, or **FASCIA**. See **FASCIA**.

**FACIES**, **FACE**. See the article **FACE**.

**FAK**, or **FAKE**. See the article **FAKE**.

**FACTION**, a cabal or party formed in a state, city, or company.

**FACTION**, in antiquity, a name given to the different companies of combatants in the circus. They were four, *viz.* the white, the red, the green, and the blue; to which Domitian added another of purple colour. They were so denominated from the colour of the liveries they wore, and were dedicated, according to M. Aur. Cassiodorus, to the four seasons of the year, the green being consecrated to spring, the blue to winter, the red to summer, and the white to autumn. It appears from ancient inscriptions, that each faction had its procurators and physician; and from history, that party-rage ran so high among them, that in a dissension between two factions, in the time of Justinian, almost forty thousand men lost their lives in the quarrel.

**FACTITIOUS**, any thing made by art, in opposition to what is the produce of nature. Thus, factitious cinnabar is opposed to native cinnabar. See the article **CINNABAR**.

**FACTOR**, in commerce, is an agent or correspondent residing beyond the seas, or in some remote part, commissioned by merchants to buy or sell goods on their account, or assist them in carrying on their trade.

A factor receives from the merchants, his constituents, in lieu of wages, a commission or factorage, according to the usage of the place where he resides, or the business he transacts, this being various in different countries, and on the purchases and sales of different commodities. He ought to keep strictly to the tenor of his orders, as a deviation from them, even in the most minute particular, exposes him to make ample satisfaction for any loss that may accrue from his non-observance of them: and it is very reasonable it should be so, as the distance of his situation renders him unable to judge of his principal's views and intention. When unlimited orders are given to factors, and they are left to sell or buy on the best conditions they can, whatever detriment occurs to their constituents, they are excused, as it is to be presumed they acted for the best, and were governed by the dictates of prudence. But a bare commission to sell is not sufficient authority for the factor to trust any person, wherefore he ought to receive the money on the delivery of the goods; and, by the general power, he may not trust beyond one, two, or three months, &c. the usual time allowed in sales, otherwise he shall be answerable out of his own estate. If a factor sells on the usual trust to a person of good credit, who afterwards becomes insolvent, he is discharged; but not if the man's credit was bad at the time of sale. If a factor give a man time for payment of money contracted on sale of his principal's goods, and, after that time is elapsed, sell him goods of his own for ready money, and the man becomes insolvent, the factor in equity ought to indemnify his principal, but he is not compellable by the common law. A factor should always be punctual in the advices of his transactions, in sales, purchases, freights, and more especially in draughts by exchange: he should never deviate from the orders he receives in the execution of a commission for purchasing goods, either in price, quality, or kind; and if, after goods are bought, he sends them to a different place from what he was directed to, they must remain for his own account, except the merchant, on advice

advice of his proceedings, admits them according to his first intention. A factor that sells a commodity under the price he is ordered, shall be obliged to make good the difference: and if he purchases goods for another at a price limited, and afterwards they rise, and he fraudently takes them for his own account, and sends them to another part, in order to secure an advantage that seemingly offers, he will, on proof, be obliged, by the custom of merchants, to satisfy his principal for damages. If a factor, in conformity with a merchant's orders, buys with his money, or on his credit, a commodity he shall be directed to purchase; and, without giving advice of the transaction, sells it again to profit, and appropriates to himself the advantage, the merchant shall recover it from him, and besides have him amerced for his fraud. When factors have obtained a profit for their principal, they must be cautious how they dispose of it; for if they act without commission, they are responsible: and if a merchant remits goods to his factor, and about a month after draws a bill on him, the factor, having effects in his hands, accepts the bill, then the principal breaks, and the goods are seized in the factor's hands for the behalf of the creditors, it has been conceived the factor must answer the bill notwithstanding, and come in a creditor for so much as he was obliged, by reason of his acceptance, to pay. A factor who enters into a charter-party with a master for freight, is obliged by the contract; but if he loads aboard generally, the principal and the lading are liable for the freightment, and not the factor. If a factor, having money in his hands belonging to his principal, neglect to insure a ship and goods, according to order, if the ship miscarry, the factor, by the custom of merchants, shall make good the damage; and if he make any composition with the insurers after insurance, without orders so to do, he is answerable for the whole insurance. As fidelity and diligence are expected from the factor, so the law requires the like from the principal; if, therefore, a merchant remits counterfeit jewels to his factor, who sells them as if true; if he receive loss or prejudice by imprisonment or other punishment, the principal shall not only make full satisfaction to the factor, but to the party who bought the jewels.

What is here said of factors, is meant of such as reside abroad to act for merchants, and may be applied to supercargoes, who go a voyage to dispose of a cargo, and afterwards return with another to their principals: but it is also the custom of the merchants of the highest credit throughout the world, to act mutually in the capacity of factors for each other. The business so executed is called commission-business, and is generally desirable by all merchants, provided they have always effects in their hands, as a security for all the affairs which they transact for the account of others. And this class of traders of established reputation, have current as well as commission account, constantly between them, and draw on, remit to, and send commissions to each other only by the intercourse of letters which, among men of honour, are as obligatory and authoritative as all the bonds and ties of law.

**FACTOR**, in multiplication, a name given to the multiplier and multiplicand, because they constitute the product. See the article **MULTIPLICATION**, &c.

**FACTORAGE**, called also commission, is the allowance given to factors by the merchant who employs them. The gain of factorage is certain, however the voyage or sale prove to the merchant: but the commissions vary; at Jamaica, Barbadoes, Virginia, and most of the western parts of the world the commission runs at  $8 \text{ per cent.}$  generally through Italy,  $2 \frac{1}{2}$ ; in France, Spain, and Portugal, &c. 2; and in Holland, and other places near home,  $1 \frac{1}{2} \text{ per cent.}$

**FACTORY** is a place where a considerable number of factors reside, to negotiate for their masters or employers. See the article **FACTOR**.

The most considerable factories belonging to the British are those established in the East-indies, Portugal, Turkey, &c.

**FACTUM**, in arithmetic, the product of two quantities multiplied by each other.

**FACULÆ**, in astronomy, certain bright and shining parts, which the modern astronomers have, by means of telescopes, observed upon or about the surface of the sun: they are but very seldom seen. See the article **SUN**.

**FACULTY**, in law, a privilege granted to a person, by favour and indulgence, of doing what, by law, he ought not to do.

For granting these privileges, there is a court under the archbishop of Canterbury,

bury, called the court of the faculties, the chief officer whereof is styled master of the faculties; who has a power of granting dispensations in divers cases, as to marry without the bans being first published; to eat flesh on days prohibited; to ordain a deacon under age; for a son to succeed his father in his benefice; a clerk to hold two or more livings, &c.

**FACULTY**, in the schools, a term applied to the different members of an university, divided according to the arts and sciences taught there: thus in most universities there are four faculties, *viz.* 1. Of arts, which include humanity and philosophy. 2. Of theology. 3. Of physic. And, 4. Of civil law. The degrees in the several faculties in our universities are those of bachelor, master, and doctor. See the articles **DEGREE**, **BACHELOR**, &c.

**FACULTY of advocates**, a term applied to the college or society of advocates in Scotland, who plead in all actions before the court of session. They meet in the beginning of every year, and choose the annual officers of the society, *viz.* dean, treasurer, clerks, private and public examiners, and a curator of their library. The manner of admission into the faculty of advocates is by a trial in the civil law, and scotch law: the person desiring to be admitted, having, upon petition, obtained a recommendation to the dean of the faculty, he giveth a remit to the private examiners, who are nine in number, and who, after their election, having divided the body of the civil law into nine parts, each taking one, appoint a diet for examination: in this diet there must be at least seven present, each of whom examines the candidate; and the question being afterwards put, Qualified, yea or no? they give their opinion by balloting, upon which the candidate is either admitted by signing his petition, or remitted to his studies. After the private trial, the dean of the faculty assigns the candidate a title of the civil law, for the subject of a thesis, which being distributed among the advocates, the faculty meet on a day appointed, when three at least of fifteen public examiners dispute against the thesis; and afterwards the faculty give their opinions by balloting, as in the private trial. If the candidate is found qualified, the dean assigns him a law for an harangue before the lords, which harangue being made, he is admitted a member of the faculty, upon paying the fees, taking the oaths to the

government, and an oath to be faithful in his office.

**FACULTY** is also used to denote the powers of the human mind, *viz.* understanding, will, memory, and imagination. See the articles **UNDERSTANDING**, &c.

The doctrine of the use and objects of the mental faculties, says lord Bacon, has two parts well known, *viz.* logic and ethics, the one producing resolutions and the other actions. The imagination, indeed, on both sides performs the office of agent or ambassador, and assists alike in the judicial and ministerial capacity. Wolfius, in his *Analyt. Psycholog.* after establishing the existence of the soul, considers it with respect to its faculty of understanding, which he distinguishes into superior and inferior. The inferior comprehends perception, the source of ideas, thought, imagination, the power of feigning, memory, forgetfulness, and recollection. The superior part of the faculty of understanding consists in attention and reflection, in understanding in general, and its three operations in particular, and in the natural dispositions of the understanding. The second general faculty of the soul, is that of desiring an object, considered as a good; from whence results the contrary determination, when it is looked upon as an evil. This faculty he also distinguishes into inferior and superior: the first is nothing else than the sensitive appetite, the desire or aversion we entertain for objects, when we allow ourselves to be guided by the confused ideas of our senses; hence arise the passions: the superior part is the will, considered so far as it is determined by distinct ideas, exempt from all mechanical impressions; and the use we make of this power of determining, is liberty.

**FÆCES**, in chemistry, the gross matter, or sediment, that settles at the bottom after distillation, fermentation, and the like.

The fæces of wine are more generally known by the name lees. See **LEES**.

**FÆCES**, in medicine, the excrements voided by stool. See **EXCREMENT**.

**FÆCULA**, in pharmacy, a form of medicine, consisting of the fæces of vegetable juices, principally those of roots; the manner of making which may be gathered from the following example, as ordered in the college dispensatory. To make a fæcula of bryony, take the roots of that plant, any quantity; let them be scraped small with a knife, and squeeze

out

out their juice with a press; after standing a few hours, in vessels that are without any motion, there will be a white sediment like starch, and it must be dried in glazed pans, after the watery part is poured off by inclination.

After the same manner is prepared the *fæcula* of arum, wild radish, orrize, and the like.

**FÆCULENT**, in general, is applied to things abounding with fæces, or dregs: thus the blood and other humours of the human body, are said to be fæculent, when without that purity which is necessary to health.

**FÆNUGREEK**, or **FOENUGREEK**. See the article **FOENUGREEK**.

**FAENZA**, a city and bishop's see of Italy, situated in the pope's territories, about thirty miles east of Bologna: east long.  $12^{\circ} 38'$ , and north lat.  $44^{\circ} 30'$ .

**FÆTOR**, or **FOETOR**. See **FOETOR**.

**FAGARA**, in the materia medica, a fruit brought from the East-indies, much resembling the cubeb. This fruit is a berry, the exterior bark whereof is black and dusky, of an acrid aromatic taste: this berry, when ripe, being cut open, exhibits a dark, shining, solid seed, without either taste or smell. It is recommended against frigidities in the liver; it assists concoction, is an astringent and stomachic.

**FAGG**, in the sea-language, a term given to the end of those strands which do not go through the tops, when a cable or rope is closed.

**FAGGOT**, in times of popery here, was a badge worn on the sleeve of the upper garment of such persons as had recanted, or abjured what was then termed heresy; being put on after the person had carried a faggot, by way of penance, to some appointed place of solemnity. The leaving off the wear of this badge was sometimes interpreted a sign of apostasy.

**FAGGOTS**, among military men, persons hired by officers, whose companies are not full, to muster and hide the deficiencies of the company; by which means they cheat the king of so much money.

**FAGONA**, in anatomy, a conglomerate gland, the same with thymus. See the article **THYMUS**.

**FAGONIA**, the **CRETIC-TREFOIL**, in botany, a genus of the *decandria-monogymia* class of plants, the corolla of which consists of five cordated patent petals, with long slender ungues inserted in the

cup; the fruit is a roundish acuminate capsule composed of ten valves, which form five lobes, and as many compressed cells; the seed is single, and of a roundish figure. See plate **XCIV.** fig. 2.

**FAGOPYRUM**, **BUCK-WHEAT**, in botany, the same with helxine. See the article **HELXINE**.

**FAGOTTINO**, in music, is a single curtail, a musical instrument something like the bassoon. See the article **BASSOON**.

**FAGOTTO**, in music, the double curtail, or in reality a double bassoon, as big again as the former. See the preceding article.

**FAGUS**, the **BEECH**, in botany, a genus of the *monæcia-polyandria* class of plants, having no corolla; the stamina are generally twelve hairy filaments of the length of the cup; the antheræ are oblong; the fruit is a roundish capsule, very large, surrounded with soft prickles, composed of four valves, and containing only one cell; the seeds are two, roundish, acuminate, and three-cornered. This genus comprehends the common chefnut-tree.

**FAILLIS**, in heraldry, a french term denoting some failure or fraction in an ordinary, as if it were broken, or a splinter taken from it.

**FAILURE**, a species of bankruptcy, commonly called breaking, or stopping payments. See **BANKRUPTCY**.

**FAILURE of record**, in law, is where an action is brought against a person, who alleges, in his plea, matter of record in bar of the action, and avers to prove it by the record; to which the plaintiff replies, *Nul tiel record*, viz. There is no such record: whereupon the defendant has a day given him by the court to bring it in; and if he fails to do it, he is then said to fail of his record, and the plaintiff shall thereon have judgment. Where the tenor only of a record, &c. is brought in, or is no bar to the plaintiff's action, the party likewise fails of his record; but small variances in a record may be amended, and are no failure of record.

**FAINT-ACTION**, in law, a feigned action, or such as, although the words of the writ are true, yet, for certain causes, the plaintiff has no title to recover thereby.

**FAINT-PLEADER**, in law, a covinous, false, or collusive manner of pleading, to the deceit of a third person.

**FAINTING**. See **LIPOTHYMIA**.

**FAIR**,



**FAIR**, a greater kind of market, granted to a town, by privilege, for the more speedy and commodious providing of such things as the place stands in need of. See the article **MARKET**.

It is incident to a fair, that persons shall be free from being arrested in it for any other debt or contract than what was contracted in the same; or, at least, promised to be paid there. These fairs are generally kept once or twice a year, and, by statute, they shall not be held longer than they ought, by the lords thereof, on pain of their being seized into the king's hands, &c. Also proclamation is to be made, how long they are to continue; and no person shall sell any goods after the time of the fair is ended, on forfeiture of double the value, one fourth to the prosecutor, and the rest to the king. There is a toll usually paid in fairs, on the sale of things, and for stallage, pimage, &c. See the article **TOLL**.

Fairs abroad are either free, or charged with toll and imposition. The privileges of free fairs consist chiefly, first, in that all traders, &c. whether natives or foreigners, are allowed to enter the kingdom, and are under the royal protection, exempt from duties, impositions, tolls, &c. Secondly, that merchants, in going or returning, cannot be molested or arrested, or their goods stopped. They are established by letters-patent from the prince. Fairs, particularly free fairs, make a very considerable article in the commerce of Europe, especially that of the Mediterranean, and inland parts of Germany, &c.

The principal british fairs are, 1. Sturbridge-fair, near Cambridge, by far the greatest in Britain, and perhaps in the world. 2. Bristol has two fairs, very near as great as that of Sturbridge. 3. Exeter. 4. West Chester. 5. Edinburgh. 6. Wheyhill; and, 7. Burford-fair, both for sheep. 8. Pancras fair, in Staffordshire, for saddle-horses. 9. Bartholomew fair, at London, for lean and welch black cattle. 10. St. Faith's, in Norfolk, for scotch runts. 11. Yarmouth fishing fair for herrings, the only fishing fair in Great Britain. 12. Ipswich butter-fair. 13. Woodborough-hill, in Dorsetshire, for west country manufactures, as kerseys, druggets, &c. 14. Two cheese-fairs at Chipping-Norton: with innumerable other fairs, besides weekly markets, for all sorts of goods, as well our own as of foreign growth.

Among the principal free fairs in France are those of St. Germain, Lyons, Rheims, Chartres, Rouen, Bourdeaux, Troyes, Bayonne, Dieppe, &c.

The most noted fairs in Germany are those of Francfort, Leipzig, and Nuremberg, not only on account of the great trade, but the vast concourse of princes of the empire, nobility, and people, who come to them from all parts of Germany to partake of the diversions to be had.

**FAIRFIELD**, a town of New-England, in the province of Connecticut, about an hundred miles south-west of Boston: west long. 72°, and north lat. 41°.

**FAIRFORD**, a market-town, about nineteen miles south-east of Gloucester.

**FAIRY**, in antient traditions and romances, signifies a sort of deity, or imaginary genius, conversant on earth, and distinguished by a variety of fantastical actions, either good or bad.

The fairies are a peculiar species of divinities, that have but little relation to any of those of the antient Greeks or Romans, unless perhaps to the larvæ; though others, with great reason, will not have them ranked among gods, but suppose them an intermediate kind of beings, neither gods, angels, men, nor devils. They are of oriental extraction, and seem to have been invented by the Persians and Arabs, whose religion and history abound with relations concerning them: these have a particular country which they suppose the fairies to inhabit, called Fairy-land.

Spencer's *Fairy Queen* is an epic poem, under the persons and characters of fairies. In this sort of writing, the poet loses sight of nature, and entertains the reader's imagination with the characters of fairies, witches, magicians, dæmons, and departed spirits. It requires an odd turn of thought, and a peculiar cast of fancy, with an imagination naturally fruitful and superstitious.

This sort of poetry raises a pleasing kind of horror in the mind of the reader, and amuses his imagination with the strangeness and novelty of the persons who are represented in it; but the judicious object to it, as not having probability enough to affect the imagination.

**FAIRY-CIRCLE**, or **RING**, a phenomenon pretty frequent in the fields, &c. supposed, by the vulgar, to be traced by the fairies in their dances: there are two kinds of it, one of about seven yards in diameter, containing a round bare path,

a foot broad, with green grafs in the middle of it. The other is of different bigness, encompassed with a circumference of grafs, greener and fresher than that in the middle. Mess. Jeffop and Walker, in the Philosophical Tranfact. ascribe them to lightening, which is confirmed by their being most frequently produced after storms of that kind, as well as by the colour and brittleness of the grafs-roots, when first observed.

Lightening, like all other fires, moves round, and burns more in the extremity than in the middle: the second circle arises from the first, the grafs burnt up growing very plentifully afterwards. Others maintain that these circles are made by ants, which are frequently found in great numbers therein.

**FAIT**, in law, the same with deed. See the article **DEED**.

**FAITH**, *fides*, in antiquity, was deified by the Romans, and had a temple in the capitol.

Public faith is represented on medals sometimes with a basket of fruit in one hand, and some ears of corn in the other; and sometimes holding a turtle-dove. But the most usual symbol, is with her two hands joined together.

**FAITH**, in divinity and philosophy, the firm belief of certain truths upon the testimony of the person who reveals them.

The grounds of a rational faith are, 1. That the things revealed be not contrary to, though they may be above natural reason. 2. That the revealer be well acquainted with the things he reveals. 3. That he be above all suspicion of deceiving us.

Where these criterions are found, no reasonable person will deny his assent: thus, we may as well doubt of our own existence, as of the truth of a revelation coming from God, who can neither be deceived himself, nor deceive others by proposing things to be believed, that are contradictory to the faculties he has given us. Whatever propositions, therefore, are beyond reason, but not contrary to it, are when revealed, the proper matter of faith.

*Confession of FAITH.* See **CONFESSION**.

**FAITHFUL**, an appellation assumed by the mahometans. See **MUSSLUMEN**.

**LAKE**, among sailors, signifies one round or circle of a cable or hawser, coyled up out of the way.

**FAKENHAM**, a market-town of Norfolk, about sixteen miles north-west of Norwich.

**FAKIR**, in pagan theology, a kind of indian monks. who even outdo the mortifications and severities of the antient christian anachorets. See **ANACHORET**. Some of them mangle their bodies with scourges and knives; others never lie down; and others remain all their lives in one posture.

There are also another kind of fakirs, who do not practise such severities: these flock together in companies, and go from village to village, prophesying and telling fortunes. It is said that even persons of fortune, in India, become fakirs, and that there are more than two millions of them.

**FALAIS**, a town of lower Normandy, in France, sixteen miles south of Caen.

**FALCADE**, in the manege, the motion of a horse when he throws himself upon his haunches two or three times, as in very quick corvets; which is done in forming a stop and half stop. See the article **STOP**.

**FALCATED**, something in the form of a sickle: thus, the moon is said to be falcated when she appears horned. See the articles **MOON** and **PHASIS**.

**FALCARIA**, in botany, a name used by Rivinus for a species of *fium*. See the article **SIUM**.

**FALCATA**, a name used by the same botanist for the medicago. See the article **MEDICAGO**.

**FALCINELLUS**, a bird supposed to be of the heron-kind, with a long crooked bill, and called by some the black heron. See plate **XCV**. fig. 3.

It is somewhat larger than a pigeon, and is of a greenish colour, variegated with purple.

**FALCO**, in ornithology, a genus of birds, of the order of the accipitres, with three toes always before, and only one behind.

This genus comprehends the falcon-kind, properly so called, the hawk, gyrfalcon, eagle, buzzard, pygargus, lannar, kite, kestrel, &c. See **FALCON**, **HAWK**, &c.

**FALCON**, or *Gentle FALCON*, the yellow-legged falco, with a grey body spotted with brown, and with five or six broad and black fasciæ or waves on the tail. It is a very beautiful bird, about the size of a raven, and though very bold and voracious, is easily made tame and tractable.

Mr. Edwards has described two falcons brought from Hudson's Bay, both about the bigness of the common crow. One of

of these is brown on the upper part of the body, and the under part is whitish, variegated with crescent-like spots of a dark colour. The other is of a black, or very dark dusky colour, on the upper part of the body; the ridge of the wing, in the upper part, is white, and the whole under side is of a dirty clay colour, with black spots at the ends of the feathers. See plate XCVI. fig. 1. which represents the first of these.

In the choice of a falcon, take one that has wide nostrils, high and large eyelids, a large black eye, a round head, somewhat full on the top; barb feathers under the clasp of the beak, which should be short, thick, and of an azure colour; the breast large, round, and fleshy; and the thighs, legs, and feet large and strong, with the fear of the foot soft and bluish: the pounces should be black, with wings long and crossing the train, which should be short and very pliable.

**FALCON**, in gunnery, a piece of cannon. See the article **CANNON**.

**FALCONER**, one who tames, manages, and looks after falcons, or other hawks. See the next article.

A falconer should be well acquainted with the quality and mettle of his hawks, that he may know which of them to fly early, and which late. Every night, after flying, he should give them casting; one while plumage, sometimes pellets of cotton, and at another time physic, as he finds necessary. He ought also every evening to make the place clean under the perch, that by her casting he may know whether she wants scouring upwards or downwards. Nor must he forget to water his hawk every evening, except such days wherein she has bathed; after which, at night, she should be put into a warm room, having a candle burning by her, where she is to sit unhooded, if she be not ramage, that she may prune and pick herself.

A falconer should always carry mummy, and other medicines, into the field where a hawk frequently meets with accidents. Neither must he forget to take with him any of his hawking implements; and it is necessary he should be skilful in making lures, hoods of all sorts, jesses, bewets, and other furniture. Neither ought he to be without his coping-irons, to cope his hawk's beak when overgrown, and to cut her pounces and talons as there shall be occasion; nor should his cauting-irons be wanting.

**FALCONRY**, the art of training all manner of hawks, but more especially the larger sort, called falcons, to the exercise of hawking. See **HAWKING**.

When a falcon is taken, she must be seeled in such a manner, that as the feeling slackens, she may see what provision lies before her; but care ought to be taken, not to seel her too hard. A falcon or hawk newly taken, should have all new furniture, as new jesses of good leather, mailed leashes with buttons at the end, and new bewets. There should also be provided a small round stick, to stroke the hawk; because the oftener this is done, the sooner and better will she be manned. She must also have two good bells, that she may be found when she scattereth. Her hood should be well fashioned, raised and embossed against her eyes, deep, and yet strait enough beneath, that it may fasten about her head without hurting her; and her beak and talons must be a little coped, but not so near as to make them bleed.

If it be a soar-falcon, which hath already passed the seas, she will indeed be harder to reclaim, but will prove the best of falcons. Her food must be good and warm, and given her twice or thrice a day, till she be full gorged: the best for this purpose is pigeons, larks, or other live birds; because she must be broken off by degrees from her accustomed feeding. When she is fed, you must hoop and lure, as you do when you call a hawk, that she may know when you intend to give her meat. On this occasion she must be unhooded gently, and after giving her two or three bits, her hood must be put on again, when she is to get two or three bits more. Care must be taken that she be close seeled, and after three or four days, her diet may be lessened; the falconer setting her every night to perch by him, that he may awaken her often in the night. In this manner he must proceed, till he find her to grow tame and gentle; and when she begins to feed eagerly, he may give her a sheep's heart. He may now begin to unhood her in the day-time, but it must be far from company, first giving her a bit or two, then hooding her gently, and giving her as much more. When she is sharp set, he may now unhood her, and give her some meat just against his face and eyes, which will make her less afraid of the countenances of others. She must be borne continually on the fist, till she is properly

properly manned, causing her to feed in company, giving her in the morning, about sun rise, the wing of a pullet; and, in the evening, the foot of a hare or coney, cut off above the joint, flead and laid in water, which being squeezed, is to be given her with the pinnion of a hen's wing. For two or three days give her washed meat, and then plumage in more or less quantity, as she is thought to be more or less foul within. After this, being hooded again, she is to get nothing till she has gleamed and cast, when a little hot meat may be given her in company; and, towards evening, she may be allowed to plume a hen's wing in company also. Cleanse the feathers of her casting, if foul and slimy; if she be clean within, give her gentle castings; and when she is well reclaimed, manned, and made eager and sharp set, he may venture to feed her on the lure.

However, three things are to be considered before the lure be shewed her.

1. That she be bold and familiar in company, and not afraid of dogs and horses.
2. Sharp set and hungry, having regard to the hour of morning and evening, when you would lure her.
3. Clean within, and the lure well garnished with meat on both sides; and when you intend to give her the length of a leash, you must abscond yourself.

She must also be unhooded, and have a bit or two given her on the lure as she sits on your fist: afterwards take the lure from her, and hide it that she may not see it; and when she is unfeeled, cast the lure so near her, that she may catch it within the length of her leash, and as soon as she has seized it, use your voice as falconers do, feeding her upon the lure, on the ground, with the heart and warm thigh of a pullet.

Having so lured your falcon, give her but little meat in the evening; and let this luring be so timely, that you may give her plumage, and a juck of a joint next morning on your fist. When she has cast and gleamed, give her a little reaching of warm meat. About noon, tie a creance to her leash; and going into the field, there give her a bit or two upon her lure; then unwind the creance, and draw it it after you a good way; and let him who has the bird hold his right hand on the tassel of her hood, ready to unhood her as soon as you begin to lure; to which if she come well, stoop roundly upon it, and hastily seize it, let her cast two or

three bits thereon. Then unfeizing and taking her off the lure, hood her and give her to the man again; and, going farther off, lure and feed her as before.

In this manner is the falconer to proceed, luring her every day farther and farther off, till she is accustomed to come freely and eagerly to the lure; after which she may be lured in company, taking care that nothing afright her. When she is used to the lure on foot, she is to be lured on horseback; which may be effected the sooner, by causing horsemen to be about her when she is lured on foot.

When she is grown familiar to this way, let somebody on foot hold the hawk, and he on horseback must call and cast the lure about his head, the holder taking off the hood by the tassel; and if she seize eagerly on the lure without fear of man or horse, then take off the creance, and lure her at a greater distance. And if you would have her love dogs as well as the lure, call dogs when you give her her living or plumage. See the article **HAWKING**.

**FALDAGE**, an antient privilege reserved to lords, of setting up folds for sheep in any fields within their manors, for the better manurance of the same; and this, in former times, was usually done as well with their tenants sheep, as with their own.

**FALDFEY**, or **FALDFEE**, a rent or fee paid by some customary tenants, for liberty to fold their sheep on their own lands.

**FALKIRK**, a town of Scotland: west long.  $3^{\circ} 48'$ , north lat.  $56^{\circ} 20'$ .

**FALL**, the descent of a heavy body towards the center of the earth. See the articles **DESCENT**, **GRAVITY**, **ACCELERATION**, &c.

**FALL** is also the name of a measure of length used in Scotland, and containing six ells of that country. See **MEASURE** and **ELL**.

**FALL**, in the sea-language, that part of the rope of a tackle, which is hauled upon.

Also when a ship is under fail, and keeps not so near the wind as she should do, they say she falls off; or when a ship is not flush, but hath risings of some parts of her decks more than others, it is called falls.

**FALLACY**, a deception, fraud, or false appearance.

The epicureans deny that there is any such thing as a fallacy of the senses: for according to them, all our sensations and perceptions, both of sense and phantasy, are

are true : whence they make sense the primary criterion of truth. See the article **EVIDENCE**.

The cartesians, on the other hand, maintain, that we should suspect as false, or, at most, dubious, every thing that present themselves to us by means only of our external senses, because they so frequently deceive us. They add, that our senses, as being fallacious, were never given us by nature for the discovery of truth, or the contemplation of the principles of things, but only for pointing out to us what things are convenient or hurtful to our bodies. See **EXISTENCE**. The peripatetics keep a middle course : they say, that if a sensible object be taken in its common or generical view, the sense cannot be deceived about it ; but that if the object be taken under its specific view, the sense may be mistaken about it, from the want of the dispositions necessary to a just sensation, as a disorder in the organ, or any thing uncommon in the medium : thus in some disorders of the eye, all objects appear yellow ; a stick in water appears broken or crooked, &c.

**FALLACY**, or *sylogistical FALLACY*, in logic, a captious argument, which, on account of its apparent goodness and defect, is made use of to deceive a respondent not well versed in the art of sophistry. See the article **SOPHISM**.

Fallacies either arise from words or things. The foundation of all fallacy in words, is an ambiguity ; but that of fallacy in things, is very numerous.

**FALLING-SICKNESS**, the same with epilepsy. See the article **EPILEPSY**.

**FALLOPIAN TUBES**, two canals of a tortuous figure, but approaching to a conic form, joined to the fundus of the uterus, one on each side.

They are connected closely and continuously to the uterus, and more laxly to the ovaries by the *alæ vesperilionem*, and finally to the *ossâ ilei*, by the *ligamenta lata* : their length is different, six, seven, or eight fingers breadth, and sometimes more : their thickness about the middle is equal to that of one's little finger ; their extremities are smaller, that next the uterus is very small ; it opens into its cavity, and may be inflated by blowing into the uterus : or a small style may be thrust up into it : their small extremity is connected to the uterus, the other is free, and fluctuates about the abdomen : this is larger and is imbricated, or fringed round the edges ; and when there is oc-

clusion, this extremity applies itself to the ovary, embracing it with these muscular segments or fringes.

Their substance is membranaceous and cavernous : they are composed of a double membrane, the exterior one seem to be continuous with the peritonæum, and the interior with the interior membrane of the uterus. They are wrinkled on the inner surface, and are imbued with a lubricous humour ; but they are not cellulous in the human body as in beasts. They are furnished with a great number of vessels, and have a cavernous substance between their membranes, by means of which they are rendered rigid in applying their mouths to the ovary. They are also moistened on their inner surface by these vessels.

Their use in generation is very great ; they become erect in the time of the coitus, from the influx of the blood and spirits, and at that time, by a natural motion, they apply their loose fringed extremities to the ovaries, which are surrounded and imbraced by them. In this state they convey to them the prolific matter of the male semen injected into the womb ; and after one of the ovula is impregnated, they receive and convey it to the womb. The fallopian tubes are easily discovered in hens and other birds, and are called oviducts. See **OVIDUCT**.

See a representation of one of them in plate **XCVII.** fig. 1.

**FALLOW**, a pale red colour, like that of brick half burnt : such is that of a fallow-deer. See the article **DEER**.

**FALLOW-FIELD**, or **FALLOW-GROUND**, land laid up, or that has lain untilled for a considerable time.

**FALLOW-FINCH**, or **FALLOW-SMICH**, a bird otherwise called *oenanthe*. See the article **OENANTHE**.

**FALLOWING of land**, a particular method of improving land.

The great benefit of fallowing, appears by the common practice of landlords, who every where take care to oblige their tenants to a strict observance of it once in three years ; few lands being able to bear two crops without it.

It appears that none will find a year's fallowing a loss to them, let their land be what it will ; but, more particularly, the advantage of fallowing consists in, first, its laying of the land in ridges, and its exposing it to the frost, wind, sun and dews, all which sweeten and mellow the land very much ; the often stirring of it, and

and breaking the clots, dispose it for the bearing of good crops. Secondly, it kills the weeds, by turning up the roots to the sun and air; and kills not only the weeds that grew with the last corn, but wild oats, darnel, and other weeds that sow themselves, and that as soon as they begin to peep out of the ground; so that they have no time to suck out any of the heart of the land.

The way of ordering fallow-lands is, after the crop is off, to let the land lie all winter, and what grass and weeds grow on it, to eat off with sheep in April, or beginning of May. As soon as they have done sowing of corn, they begin to plow up their fallows. This first fallowing in many places, ought to be very shallow, well turned, and clapped close together, because the thinner the turf is, the easier will it dry through, and kill the weeds, especially if the weather be dry: but, in some places, where there is a very cold clay, that will not bear corn well without being exposed to the heat of the sun to warm it, they plow their first plowing the depth they design to go. About June is the time of the second plowing, which they call *two-fallowing*; at which plowing, you must go your full depth. About the latter end of July, or the beginning of August, is the time of *try-fallowing*, or last plowing, before they sow their rye or wheat: but some plow up their land oftener.

If the land rise full of clots, and if it is a binding land, you must make it fine by harrowing of it, when rain comes; but then you must not let it lie long before you strike, sieve, or plow it up into small ridges, especially if it is wet land; and as near as you can, leave no weeds, turfs, or grass unkilld, or unbroke with your harrows. But if your land will dissolve well with the frost, it is best to let it lie a little rougher, especially if you design to sow it with barley; for the rougher it lies for a winter-fallowing, the better. If the winter does not dissolve the clots, which it will not do in binding lands, you must wait rain for the fallowing of it. Where the land is but indifferent, and the manure is not to be got, fallowing every other year is found a great improvement. In some places they take a crop of wheat, and a crop of pease, and so fallow their land again.

**FALMOUTH**, a port-town of Cornwall, in England, situated in west long.  $5^{\circ} 30'$ , north lat.  $50^{\circ} 15'$ , on a fine bay of the

english channel, the entrance whereof is guarded by two forts.

**FALSE**, in general, something contrary to truth, or not what it ought to be: thus we say, a false witness, false action, false weights, false claim, &c. See the articles **WITNESS**, **ACTION**, &c.

**FALSE IMPRISONMENT**. See the article **IMPRISONMENT**.

**FALSE JUDGMENT**. See **JUDGMENT**.

**FALSHOOD**, in philosophy, an act of the understanding representing a thing otherwise than it is as to its accidents.

*Crimen falsi*, in the civil law, is fraudulent subornation or concealment with design to darken or hide the truth, and make things appear otherwise than they are. The *crimen falsi* is committed, 1. By words, as when a witness swears falsely. 2. By writing, as when a man antedates a contract, or the like. 3. By deed, as when he sells by false weights and measures.

**FALSIFYING**, in law, the proving a thing to be false.

The falsifying a record, is where a person purchases land of another, who is afterwards outlawed for felony; in this case, he may falsify the record as to the time when the felony is supposed to have been committed, and also as to the point of the offence. But in the case where a person is found guilty by verdict, such purchaser shall only falsify the time.

To falsify a recovery, may be done by the issue in tail, where it is suffered by a tenant for life.

**FALSO JUDICIO**. See the article **FALSE JUDGMENT**.

**FALSO RETURNO BREVIUM**, a writ that lies against a sheriff for false returning of writs he had got to execute.

**FALSO BORDONE**, in music, denotes the burden or ground bass of a song when it is not exact to the rules of harmony. It is also applied by the Italians to a certain harmony produced by the accompaniments of several sixths following one another, which make several fourths between two higher parts, because the third part is obliged to make tierces with the bass.

**FALX**, in anatomy, a process of the dura mater placed between the two hemispheres of the brain, and resembling a reaper's sickle.

**FALX**, the *SICKLE-FISH*, in ichthyology, a species of *tænia*, so called from its bending itself into the form of a sickle. See the article **TÆNIA**.

**FAMA**.

**FAMAGOUSTA**, a city of asiatic Turkey, situated on the east end of the island of Cyprus.

**FAMES CANINA**, an excessive appetite. See the article **BULIMY**.

**FAMILIARS** of the *inquisition*, are people that assist in the apprehending of such persons as are accused, and to carry them to prison; upon which occasion, the unhappy person is surrounded by such a number of these officious gentlemen, that there is no possibility of escaping out of their hands. As a reward of this base employ, the familiars are allowed to commit the most enormous actions, to debauch, assassinate, and kill, with impunity. See the article **INQUISITION**.

**FAMILY**, *familia*, denotes the persons that live together in one house, under the direction of one head or chief manager. It also signifies the kindred or lineage of a person, and is used by old writers for a hide or portion of land sufficient to maintain one family. See the article **HIDE**.

**FAMILY**, in natural history, a term used by authors to express any order of animals, or other natural productions of the same class. See **CLASS** and **ORDER**.

**FAMILY** of *curves*. See **CURVE**.

**FAN**, a machine used to raise wind and cool the air by agitating it. The custom which now prevails of wearing fans, was borrowed from the East, where they are almost indispensably necessary for keeping off the sun and the flies. Fans are made of a thin skin or piece of paper, taffaty, or other light stuff, cut semicircularly, and mounted on several little sticks of wood, ivory, tortoiseshell, or the like. The paper, &c. is usually painted, and in mounting is plaited in such a manner, as that the plaits may be alternately inward and outward. That this machine was known to the antients, we may infer from what Terence says, *cape hoc flabellum, & ventulum huic sic facito*. It was composed of different materials, but the most elegant were made of peacocks feathers, or perhaps were so painted as to represent a peacock's tail.

**FAN** is also an instrument used in winnowing corn.

Fans for corn pay on importation 1s. 3  $\frac{4}{10}$  d. and draw back on exportation, 1s. 1  $\frac{2}{10}$  d.

India fans pay for every 100 l. gross value at the sale 26 l. 14 s. 2  $\frac{5}{10}$  d. The draw-

back on exportation is 25 l. 2s. 11  $\frac{5}{10}$  d.

**FANANO**, a town of Italy, twenty-five miles south of Modena.

**FANATICS**, wild, enthusiastic, visionary persons, who pretend to revelation and inspiration.

The antients called those fanatici who passed their time in temples (*fana*) and being often seized with a kind of enthusiasm, as if inspired by the divinity, shewed wild and antic gestures. Prudentius represents them as cutting and flashing their arms with knives: shaking the head was also common among the fanatici; for Lampridius informs us, that the emperor Heliogabalus was arrived to that pitch of madness, as to shake his head with the gashed fanatics. Hence the word was applied amongst us to the anabaptists, quakers, &c. at their first rise, and is now an epithet given to the modern prophets, muggletonians, &c.

**FANATIO**, a term used for the fawning season in forests.

**FANCY**, or **IMAGINATION**. See the article **IMAGINATION**.

**FANIONS**, in the military art, small flags carried along with the baggage.

**FANO**, a bishop's see and port-town of Italy, situated on the gulph of Venice, in 14° east long. and 44° north lat.

**FANTASIA**, in music, the same with caprice. See the article **CAPRICE**.

**FANUM**, **TEMPLE**. See **TEMPLE**.

**FAPESMO**, a form of syllogism, wherein the major or first proposition is an universal affirmative, the minor an universal negative, and the conclusion a particular negative.

**FAQUIR**, or **FAKIR**. See **FAKIR**.

**FAR**, in horsemanship, an appellation given to any part of a horse's right side: thus the far foot, far shoulder, &c. is the same with the right foot, right shoulder, &c.

**FARCE**, was originally a droll or petty shew exhibited by mountebanks and their buffoons in the open streets, to gather the people together. At present it is of more dignity: it is removed from the street to the theatre, and instead of being performed by merry-andrews to amuse the rabble, is acted by comedians, and become the entertainment of a polite audience. Poets have reformed the wildness of the primitive farces, and brought them to the taste and manner of comedy. The difference between the two on our stage is, that comedy keeps to nature and probability, and therefore is confined to certain laws prescribed by antient critics, whereas

whereas farce difallows of all laws, or rather lets them aside on occasion. Its end is purely to make merry, and it sticks at nothing which may contribute thereto, however wild and extravagant. Hence the dialogue is usually low, the persons of inferior rank, the fable or action trivial or ridiculous, and nature and truth every where heightened and exaggerated to afford the more palpable ridicule.

**FARCEY**, or **FARCIN**. See the article **FARCIN**.

**FARCIMINALIS TUNICA**, in anatomy, the same with the allantois. See the article **ALLANTOIS**.

**FARCIN**, **FARCY**, or **FASHIONS**, in farriery, a creeping ulcer, and the most loathsome, stinking, and filthy disease that a horse can be affected with.

It proceeds from corrupt blood engendered in the body by over-heats and colds, and begins first with hard knots and pustules, which at length over-run the horse's whole body. Its origin is commonly in a vein, or near some master vein, which feeds and nourishes the disease.

Sometimes it is occasioned by spur-galling, with rusty spurs, snaffle-bit, or the bite of another horse infected with the same disease.

For the cure, first bleed the horse well; then take oil of bay and euphorbium mixed together, and anoint the knots with it; or bathe the place with the stale of an ox or cow, and the herb called lion's foot, all boiled together. Some apply tallow and horse-dung, burn the knots with a hot iron, or wash the sore with salt, vinegar, alum, verdigrease, green copperas, and gun-powder, boiled in chamber-lee. Others again anoint the sores with a salve made of a penny-worth of tar, two penny-worth of white mercury, and two handfuls of pigeon's dung.

*Water* **FARCIN**, a swelling under a horse's belly and chaps, which, being pierced with a hot iron, yields abundance of yellow, grey, and oily water. It proceeds from a horse's feeding in low watery grounds, or in pits and holes where the grass grows above water.

The common way of curing this malady, is by letting out the matter of the swelled parts with a long iron-rod, heated red hot; washing the parts with chamber-lee and salt, mixed with some powder of bole armenic, and made as hot as may be endured, for three or four times.

**FARDING-DEAL**, the fourth part of an acre of land. See the article **ACRE**.

**FARE**, most commonly signifies the money paid for a voyage, or passage by water; but, in London, it is what persons pay for being conveyed from one part of the town to another in a coach or chair. See the articles **COACH**, **WATERMEN**, &c.

**FAREHAM**, a market-town of Hampshire, ten miles east of Southampton.

**FAREWELL CAPE**, the most southerly promontory of Greenland, in 50° west long. and 60° north lat.

**FARFARA**, in botany, a name used by some for tussilago or colt's foot.

**FARINA**, a latin term signifying meal, or the flower of corn. See **CORN**.

**FARINA FOECUNDANS**, among botanists, the impregnating meal or dust on the apices or antheræ of flowers; which being received into the pistil, uterus, or seed-vessel of plants, secundates the rudiments of the seeds in the ovary, which otherwise would decay and come to nothing. See the article **GENERATION of plants**.

**FARINAGIUM**, signifies a toll of meal or flour.

**FARINGTON**, a market-town of Berkshire, twenty-five miles north-west of Reading.

**FARLEY**, or **FARLIEU**, money paid by tenants in the west of England, in lieu of a heriot. See the article **HERIOT**.

**FARM**, or **FERM**, signifies the chief messuage in a village, or any large messuage, whereto belongs land, meadow, pasture, wood, common, &c. and which has been used to let for term of life or years, under a certain yearly rent payable by the tenant for the same.

In different parts of the country, a farm is called by different appellations: in Lancashire, it is termed ferm-hold; in Essex, a wike; and in the north, a tack. According to some, a farm should make three rents, or its produce should amount to three times the rent, one for the landlord, another for the charges of cultivating it, and the third for the farmer and his family to live on.

**FARMER**, the person who occupies or is lessee of a farm, whether for life or years. See the articles **FARM** and **LEASE**.

Husbandman is the proper addition of a farmer, husbandry being the mystery or art he professes.

**FARMER**, among miners, signifies the lord of the field, or the person who farms the lot and cope of the king.

**FARNHAM**, a market-town in the county of Surrey, ten miles west of Guilford, remarkable for its large plantations of hops.

**FARO**,



**FARO**, a sea-port to vn of Portugal, in the province of Algarva: west long. 9°, north lat. 36° 50'.

**FARRA**, in ichthyology, the same with the albula nobilis. See **ALBULA**.

**FARREATION**, or **CONFARREATION**, in antiquity. See **CONFARREATION**.

**FARRIER**, one whose employment is to shoe horses, and cure them when diseased or lame.

**FARRIER'S POUCH**, a leather-bag, in which are contained nippers, drivers, shoes for all sizes of feet, good sharp nails, and all the implements for new shoeing a horse that has lost his shoe upon the road.

A gentleman on a journey ought to have one of these pouches well provided, and a groom that knows how to drive nails.

**FARRIERY**, the art of trimming the feet, and curing diseased horses. See **HORSE**.

**FARS**, or **FARSISTAN**, the antient Persis, being a province of Persia lying northward of the gulph of Persia. Its chief town is Schiras.

**FARTHELLING**, among seamen, the same with furling. See **FURLING**.

**FARTHING**, the least copper-coin used in Britain, being half of the half-penny. See the article **COIN**.

**FASCE**, or **FESSE**, in heraldry. See the article **FESSE**.

**FASCES**, in roman antiquity, axes bound up together with rods or staves, and carried before the roman magistrates as a badge of their authority and office.

The use of the fasces was introduced by the elder Tarquin, as a mark of sovereign authority: in after times they were borne before the consuls, but by turns only, each his day. They had twelve of them carried by so many lictors. See the article **LICTOR**.

After the consuls, the prætors assumed them, and Censorinus observes they had only two, though Plutarch and Polybius give them six. In the government of the decemviri, it was the practice at first for only two of them to have the fasces. Afterwards, each of them had twelve, in the same manner as the kings.

**FASCETS**, in the art of making glass, are the irons thrust into the mouths of bottles, in order to convey them into the annealing tower.

**FASCIA**, in architecture, signifies any flat member having a considerable breadth and but a small projecture, as the band of an architrave, larmier, &c.

Fascias, in brick buildings, are certain jutting out of the bricks over the win-

dows of each story, except the upper one. These are sometimes plain, like those of columns; but sometimes they are moulded, and the moulding is usually a scima reversa at the bottom, above which are two plain courses of bricks, then an astragal, and, lastly, a boudin. See the articles **ASTRAGAL** and **BOULTIN**.

**FASCIA LATA**, in anatomy, called also **musculus membranofus**, is a muscle of the tibia or leg, arising fleshy from the anterior part of the anterior and superior spine of the ileum. Soon after its origin it becomes intirely membranaceous, and closely surrounds the muscles of the thigh; after which it is inserted in the upper part of the tibia, near the head of the fibula, and from thence sends out an aponeurosis almost over the whole tibia.

The fascia lata serves to draw back the thigh, and to elevate both this and the leg; it is therefore, as well as some other of the adjacent muscles, common to both the thigh and the leg.

**FASCIÆ**, in astronomy, certain parts on jupiter's body resembling belts or swaths. They are more lucid than the rest of that planet, and are terminated by parallel lines, sometimes broader and sometimes narrower. Mr. Huygens observed a fascia in mars much broader than those of jupiter, and possessing the middle part of his disk, but very obscure.

**FASCIALIS**, in anatomy, a muscle of the leg called also **fastorius**. See the article **SARTORIUS**.

**FASICULUS**, in medicine, denotes a hand-ful, or according to some, as much as can be taken up between the finger and the thumb.

**FASCINATION**, a kind of witchcraft or enchantment supposed to operate by the influence either of the eye or tongue.

To the first kind of fascination, Virgil alludes in his third eclogue, *nescio quis teneros oculus mihi fascinat agnos*. To the second, in his seventh eclogue, in these lines.

*Aut, si ultra placitum laudarit, baccare frontem*

*Cingite, ne vati noceat mala lingua futuro.*

**FASCINES**, in fortification, faggots of small wood of about a foot diameter and six feet long, bound in the middle and at both ends. They are used in raising batteries, making chandealers, in filling up the moat to facilitate the passage to the wall, in binding the ramparts where the earth is bad, and in making parapets of trenches to screen the men.

Fascines are sometimes pitched over, to be thrown upon the enemies works in order to set them on fire. They differ from saucissons, being made of small wood, whereas the saucissons are made of branches of trees. See the article SAUCISSON.

See also fascines supported by a chandelier in plate XCVII. fig. 2.

**FASHION**, a term used among artificers in gold and silver, for the trouble, time, and labour employed in a piece of work. It is by the fashion that workmen's wages are regulated.

**FASHION-PIECES**, in the sea-language, are two compassing pieces of timber, into which is fixed on each side the transform. See the article TRANSOM.

**FASSETS**, or **FACETS**, among jewellers. See the article FACETS.

**FAST**, or **FASTING**, in general, denotes the abstinence from food; but is more particularly used for such abstinence on a religious account.

Solemn fasts have been observed in all ages and nations, especially in times of mourning and affliction.

Among the Jews, the calamities for which fasting was enjoined, were a siege, the sword, pestilence, locusts, the caterpillar, diseases, famine, and the like. Upon these days, they wore sack cloth next the skin, their cloaths were rent, and they wore no shoes: they likewise sprinkled ashes upon their heads, and neither washed their hands, nor anointed their bodies with oil, as usual.

The Greeks and Romans, and, in short, every nation of antiquity, had their stated as well as occasional fasts.

The ancient christians had two sorts of solemn fasts, *viz.* weekly and annually; the former being observed every Wednesday and Friday, and the latter, during lent. See the article LENT.

The church of England, greek and roman churches, &c. have likewise their stated and occasional fasts. But, by a statute of queen Elizabeth, it is enacted, that whosoever by preaching, teaching, writing, &c. affirms it to be necessary to abstain from flesh, for the saving of the soul of man, or for the service of God, shall be punished as a spreader of false news.

Fasting is likewise enjoined by the mahometan religion, witness their ramadan or lent; and even the pagans of India have several remarkable fasts. See the article RAMADAN.

**FAST-DAYS**, those appointed, by public authority, to be observed in fasting and humiliation.

**FAST-GROUND**, or **FAST-COUNTRY**, among miners, denotes the same with shelf. See the article SHELF.

**FASTERMANS**, among our saxon ancestors, were pledges or bondsmen, who were answerable for each others good behaviour.

**FASTI**, in roman antiquity, the calendar wherein were expressed the several days of the year, with their feasts, games, and other ceremonies.

There were two sorts of fasti, the greater and less; the former being distinguished by the appellation *fasti magistrales*, and the latter by that of *fasti calendares*.

The greater fasti contained the feasts, with every thing relating to religion and the magistrates.

The lesser were again distinguished into the city and country fasti, each adapted to the people for whom they were designed. In all these fasti, the court-days, or those whereon causes might be heard and determined, were marked with the letter F; these days were called fasti, from *fari*, to speak or pronounce; and the other days, not marked with this letter, were called nefasti.

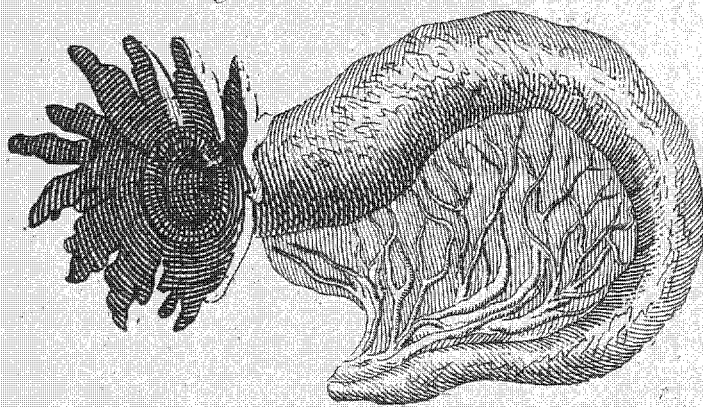
**FASTI CONSULARES**, was also a tablet or chronicle, wherein the several years were denoted by the respective consuls, with the principal events that happened during their consulship. And hence, the term fasti is still applied to the archives and public registers of a nation.

**FASTIGIUM**, in architecture, the same with pediment. See PEDIMENT.

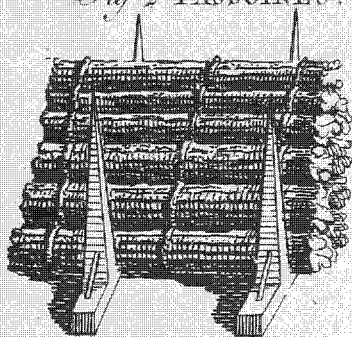
**FAT**, in anatomy, an oleaginous or butyraceous matter, secreted from the blood, and filling up the cavity of the adipose cells. Fat, properly and distinctly so called, is not secreted from glandules, but from the little arteries of the adipose membrane. Authors distinguish it into two kinds, which they express by the words *sebum* or *adeps*, and *pinguedo*. See the articles SEBUM and PINGUEDO.

According to this distinction, there is no such thing as *sebum* or hard fat in the human body, its fat being all of that sort expressed by *pinguedo*, or soft and oily. That this oleaginous matter has a circulatory motion, or an egress into the veins, is very evident from the sudden consumption of it in many diseases, and from its vast diminution by exercise or labour.

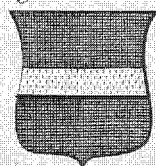
*Fig. 1.* FALLOPIAN TUBE.



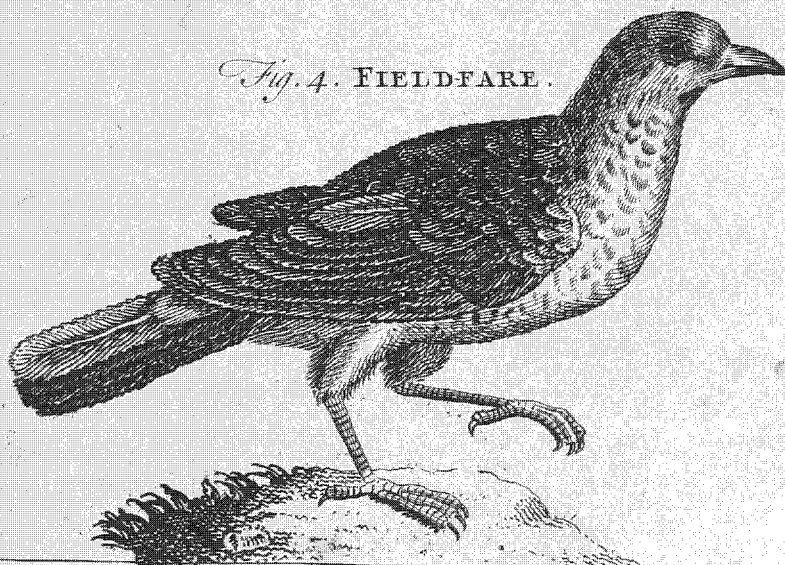
*Fig. 2* FASSCINES.



*Fig. 3* FESSE.



*Fig. 4.* FIELDFARE.



*T. J. Jefferys sculp.*



The uses of fat are, 1. To serve as a kind of covering to the body, in order to defend it from cold and other injuries. 2. To defend the more tender and sensible parts from being too strongly velligated by the salts. 3. To preserve in good order the flexion of the muscles, of the cutis, and of the other parts between and about which it is placed. 4. To facilitate the motions of some parts, as the eyes, jaws, &c. 5. To fill up a number of empty interstitial spaces, and by that means to add greatly to the symmetry and beauty of the parts; as is evidently the case in the face, the neck, &c. and to facilitate the distension of the parts, the spaces between which it thus fills up. There is evidently a great use of the fat about the vagina, the anus, the ossa ischii, and pudenda; which filling up many large spaces there, gives way greatly in the distension of those parts in the exclusion of the fœtus, and even of the harder excrements. 6. To prevent the painful pressure and attrition of the parts, particularly in the soles of the feet, the nates, and other the like parts; in all which the fat is copiously disposed, and serves in the place of a cushion for the muscular flesh to rest upon. 7. And, finally, there is great reason to suppose, that when the body does not receive nourishment in the usual way, the regrefs of the fat into the veins supplies that defect.

The fat of several animals, as a goose, dog, viper, bear, and even that of mankind, are met with prescribed in the intention of suppuratives and digestives; for being of a penetrating nature, they are supposed to dissolve and rarify the inclosed humours, and bring them to what is called maturity. See SUPPURATIVES and RIPENERS.

The best way of preparing fat for medicinal use, is to free it from skins, veins, fibres, &c. and after washing it till it becomes unbloody, to melt, strain, and preserve it from air.

FAT, in the sea-language, signifies the same with broad. Thus a ship is said to have a fat quarter, if the trussing in or tuck of her quarter be deep.

FAT is also used for several utensils, as, 1. A great wooden vessel, used for the measuring of malt, and containing a quarter or eight bushels. 2. A large brewing-vessel, used by brewers to run their wort in. 3. A leaden pan or vessel for the making of salt at Droitwich.

FAT likewise denotes an uncertain measure

of capacity. Thus a fat of isinglass contains from  $3\frac{1}{4}$  hundred weight to 4 hundred weight; a fat of unbound books, half a maund or four bales; of wire, from 20 to 25 hundred weight; and of yarn, from 220 to 221 bundles.

FATE, *fatum*, denotes an inevitable necessity depending upon a superior cause. The Greeks called it *εὐαίμα*, as it were a chain or necessary series of things indissolubly linked together. It is also used to express a certain unavoidable designation of things, by which all agents, both necessary and voluntary, are swayed and directed to their ends. See the article NECESSITY.

In this last sense, fate is distinguished into, 1. Astrological, arising from the influence and position of the heavenly bodies, which (it is supposed) give laws both to the elements and mixed bodies, and to the wills of men. 2. Stoical fate, defined by Cicero an order or series of causes, wherein cause being linked to cause, each produces another, and thus all things flow from one prime cause. To this fate, the stoics subject even the gods.

Fate is divided by later authors into physical and divine.

Physical fate, is an order and series of natural causes appropriated to their effects.

By this fate it is that fire warms, bodies communicate motion to each other, &c. and the effects of it are all the events and phenomena of nature. See NATURE.

Divine fate, is what is more usually called providence. See PROVIDENCE.

FATES, *parcæ*, in mythology. See the article PARCÆ.

FATHER, a term of relation denoting a person who hath begot a child.

By the laws of Romulus, a father had an unlimited power over his children. Amongst the Lacedæmonians, as we learn in Aristotle's politics, the father of three children was excused from the duty of mounting guard for the security of the city; and a father of four children, was exempted from every public burden. The poppæan law amongst the Romans, granted many noble privileges to the fathers of three children, amongst which one was, that he should be excused from civil offices, and that the mother should have liberty, in her father's life-time, to make a will, and manage her estate without the authority of tutors.

Natural FATHER, is he who has illegitimate children.

**FATHER IN LAW**, is a person who has married a woman, who has children by a former marriage.

**Grand-FATHER.** See **GRAND-FATHER.**

**FATHER**, in theology, is used in speaking of the first person of the trinity. See the article **TRINITY.**

**FATHER** is also used in speaking of spiritual and moral things. Thus, Abraham is called the father of the faithful.

**FATHER** in church-history, is applied to antient authors who have preserved in their writings the tradition of the church. Thus St. Chrysostom, S. Basil, &c. are called Greek fathers, and St. Augustine and St. Ambrose latin fathers. No author who wrote later than the twelfth century is dignified with the title of Father.

**FATHER** is also a title of honour given to prelates and dignitaries of the church, to the superiors of convents, to congregations of ecclesiastics, and to persons venerable for their age or quality. Thus we say the right reverend father in God, the father general of the benedictines, the fathers of the council of Nice, father of his country, &c.

*Dist. de Trevoux.*

**FATHER-LASHER**, a name given by the people of Cornwall to a fish of the cottus-kind, with the upper jaw longest, and a prickly head. See **COTTUS.**

**FATHOM**, a long measure containing six feet, chiefly used at sea for measuring the length of cables and cordage.

**FATNESS.** See the article **CORPULENCY.**

**FATTENING** of oxen, horse, swine, poultry, &c. in husbandry. See the articles **OX**, **HORSE**, &c.

**FATUUS IGNIS**, in physiology, a meteor, otherwise called will with a wiip. See the article **WILL.**

**FAUCON**, or **FALCON.** See **FALCON.**

**FAUCONET**, or **FALCONET.** See the article **FALCON.**

**FAVIFORM**, in general, something resembling a honey comb. Surgeons give this appellation to certain ulcers, which emit a sanies thro' little holes, especially in the head. See **HONEY-COMB.**

**FAVISSÆ**, in antiquity, were according to Festus and Gellius, cisterns to keep water in: but the favissæ in the capital at Rome were dry cisterns, or subterraneous cellars, where they laid up the old statues, broken vessels, and other things used in the temple. These were much the same with what in some of the

modern churches are called the archives and treasury.

**FAUNALIA**, in roman antiquity, three annual festivals in honour of the God Faunus, the first of which was observed on the ides of February; the second on the 16th of the calends of March; and the third on the nones of December. The principal sacrifices on this occasion were lambs and kids. Faunus was a deity of the Romans only, being wholly unknown to the Greeks. Virgil makes him a God of oracles and predictions. Horace calls him the guardian and protector of men and wit, and recommends to him the care of his estate. Ovid represents this deity with horns on his head, and crowned with the pine-tree. It is supposed the roman Faunus was the same with the greek Pan.

**FAUNS**, *fauni*, a kind of rural deities, among the antient Romans, represented with horns on their heads, sharp pointed ears, and the rest of their bodies like goats; they were the sons of Faunus. See the preceding article.

The Fauni, when they met any person, would terrify and stupify him with their very looks; and were the frequent cause of miscarriages to big-bellied women: they were thought to inhabit the woods together with the nymphs and satyrs.

**FAVORITO**, in music, as *choro favorito*, a chorus, in which are employed the best voices and instruments, to sing the recitatives, play the ritornella's, &c. this is otherwise called the little chorus, or *choro recitante*. See **RECITANTE.**

**FAUQUEMONT**, in geography. See the article **VALKENBURG.**

**FAUSSE-BRAYE**, in fortification, a small rampart without the true one, about three or four fathom wide, and bordered with a parapet and banquette.

The design of a fausse-braye is to defend the fosse: it is not reckoned to useful, where there is a dry moat, because the besieged may make better works for the defence of it than a fausse-braye, such as traverses, scillons and coffers; but in places surrounded with a wet ditch, a fausse braye is more useful, provided it be made only before the curtain and flanks; for lying low, it cannot be easily hurt by the enemies cannon, and it defends the fosse better, because of its low situation, than the true rampart, which on account of its height cannot so well discover the fosse: fausse-brayes ought never

never to be made before the faces, especially in places faced with brick, or stone, because the breach being generally made in the face, the ruins and rubbish of the rampart are stopped in the fausse-braye, which facilitates the ascent of the breach, and in places lined with brick or stone, the pieces of stone or brick fly among the soldiers that are in the fausse-braye. See FORTIFICATION.

FAWN, among sportsmen, a buck, or doe, of the first year; or the young one of the buck's breed in its first year.

FAYAL, one of the Azores-islands. See the article AZORES.

FE, or St. FE, the capital of New Mexico: west long. 109°, north lat. 36°.

St. FE *de bagota*, the capital of the kingdom of New Granada: west long. 73°, north lat. 4°.

It is an archbishopric and the seat of the governor of the province, &c.

St. FE is also a town of Spain, in the province of Granada, situated on the river Xenil: west lon. 3° 45', north lat. 37° 20'.

St. FE is also the capital of a province of the same name, in Terra firma in south America, situated on the river of St. Martha, 200 miles south of Carthagena: west long. 77°, north lat. 7° 24'.

FEALTY, in law, an oath taken on the admittance of any tenant, to be true to the lord of whom he holds his land: by this oath the tenant holds in the freest manner, on account, that all who have fee, hold *per fidem & fiduciam*, that is, by fealty at the least.

This fealty, at the first creation of it, bound the tenant to fidelity, the breach of which was the loss of his fee. It has been divided into general and special: general, that which is to be performed by every subject to his prince; and special, required only of such as, in respect of their fee, are tied by oath to their lords. To all manner of tenures, except tenancy at will, and frank-almoign, fealty is incident, though it chiefly belongs to copyhold estates, held in fee and for life. The form of this oath by stat. 17 Ed. II. is to run as follows. "I  
" A. B. will be to you my lord D. true  
" and faithful, and bear to you faith  
" for the lands and tenements which I  
" hold of you, and I will truly do and  
" perform the customs and services that  
" I ought to do to you. So help me  
" God."

FEAST, or FESTIVAL, in a religious sense, is a day of feasting and thanksgiving.

Among the antients, feasts were instituted upon various accounts, but especially in memory of some favourable interposition of providence. Thus, the Jews had their feasts of passover, pentecost, and tabernacles; the Greeks, their cerealia, panathenæa, &c. and the Romans, their saturnalia, ambarvalia, &c. See PASSOVER, CEREALIA, &c.

In the antient Christian church, besides the high festivals of Christmas, Easter, Pentecost, Annunciation, &c. there were others instituted in honour of the apostles and martyrs: all which are retained by the church of England. See the articles CHRISTMAS, EASTER, &c. In the church of Rome, there are double, half-double, and simple feasts almost without number. The name of double feasts is given to such whose service is fuller and more solemn than the rest, which likewise constitutes the difference between the others; the churches being embellished, and the altars adorned, according to the rank which each saint holds in his respective church. All high festivals have an octave, consisting of the feast itself, and the seven following days.

In Italy, certain festivals are celebrated solely by the lovers of that country. When a lover wants to give his mistress the highest testimony of his gallantry, he immediately makes her the idol of his devotion; procuring vespers, and even masses, to be said in her honour. For this purpose he makes choice of the festival of some saint whose name she bears; and though the saint has the same name, they manage matters so, that the devotion of the festival is plainly relative to the lover's mistress.

The four quarterly feasts, or stated times, whereon rent on leases is usually reserved to be paid, are Lady-day, or the annunciation of the blessed virgin Mary, or 25th of March; the nativity of St. John the Baptist, held on the 24th of June; the feast of St. Michael the archangel, on the 29th of September; and Christmas, or rather of St. Thomas the apostle, on the 21st of December. See the article ANNUNCIATION, &c.

FEATHER, in physiology, a general name for the covering of birds; it being common to all the animals of this class

to have their whole body, or at least the greatest part of it, covered with feathers or plumage.

There are two sorts of feathers found on birds, *viz.* the strong and hard kind, called quills, found in the wings and tail; and the other plumage, or soft feathers, serving for the defence and ornament of the whole body. All birds, so far as yet known, moult the feathers of their whole body yearly.

Feathers make a considerable article of commerce, as serving for beds, writing-pens, &c. Those for beds pay, on importation, 1l. 3s. 1<sup>2</sup>/<sub>8</sub>d. and draw back 1l. 6s. 3d. Ostrich-feathers, if dressed, pay 7s. 8<sup>2</sup>/<sub>8</sub>d. the pound, but if undressed only 3s. 10<sup>2</sup>/<sub>8</sub>d.; drawing back in the former case, 6s. 9d. and in the latter, 3s. 4<sup>1</sup>/<sub>2</sub>d.

**FEATHER-BED.** See the article **BED**.

Feather-beds, whether old or new, pay, on importation, each 10s. 3<sup>1</sup>/<sub>8</sub>d. and drawback 9s. on exporting them.

**FEATHER**, in the manege, a sort of natural frizzling of the hair, which in some parts rises above the rest, resembling the tip of an ear of corn. This happens most frequently, between the eyes; and if lower, it is a sign of a weak sight.

A feather upon a horse's neck, is called a roman feather; being a row of hair turned back, and forming a mark like a sword-blade near the mane.

**Mid-FEATHER**, in the salt-works, the partition in the middle of the furnace, which it divides into two chambers. See the article **SALT-MAKING**.

**FEATHER-EDGED**, among carpenters, an appellation given to planks or boards, which have one side thicker than the other.

**FEATHER**, or *Cut a FEATHER*. See **CUT**. *Prince's FEATHER*, a plant otherwise called amaranth. See the article **AMARANTH**.

**FEAZING**, in the sea-language, signifies the ravelling out of any great rope, or cable, at the end.

**FEBRIFUGE**, in medicine, an appellation given to such medicines as mitigate, or remove a fever. These medicines are otherwise termed antifebrilia. Febrifuge is also a name for the centaurium minus.

**FEBRIS**, **FEVER**, in medicine. See the article **FEVER**.

**FEBRUARY**, in chronology, the second month of the year, reckoning from January, first added to the calendar of Romulus by Numa Pompilius.

February derived its name from *Februa*, a feast held by the Romans in this month, in behalf of the manes of the deceased, at which ceremony sacrifices were performed, and the last offices were paid to the shades of the defunct.

February in a common year, consists only of twenty-eight days, but in the bissextile year, it has twenty-nine, on account of the intercalary day, added that year. See the article **BISSEXTILE**.

**FECIALES**, or **FOECIALES**, a college of priests instituted at Rome by Numa, consisting of twenty persons, selected out of the best families. Their business was to be arbitrators of all matters relating to war and peace, and to be the guardians of the public faith. It is probable that they were ranked among the officers of religion, to procure them the more deference and authority, and to render their persons more sacred among the people. If the commonwealth had received any injury from a foreign state, they immediately dispatched these officers to demand satisfaction, who, if they could not procure it, were to attest the Gods against the people and country, and to denounce war: otherwise they confirmed the alliance, or contracted a new one, which they ratified by sacrificing a hog.

**FECULA**, or **FÆCULA**, in pharmacy. See the article **FÆCULA**.

**FECULENT**, or **FÆCULENT**. See the article **FÆCULENT**.

**FECUNDITY**, or **FOECUNDITY**, the same with fertility. See **FERTILITY**.

**FEE**, in law, signifies a certain allowance to physicians, barristers, attornies, and other officers, as a reward for their pains and labour.

If a person refuse to pay an officer his due fees, the court will grant an attachment against him, to be committed till the fees are paid; and an attorney may bring an action of the case for his fees, against the client that retained him in his cause.

**FEE** also denotes a settled perquisite of public officers, payable by those who employ them.

The fees due to the officers of the custom-house, are expressly mentioned in a schedule, or table, which is hung up in public view in the said office, and in all other places where the said fees are to be paid or received. And, if any officer shall offend, by acting contrary to the regulations therein contained, he shall



shall forfeit his office and place, and be for ever after incapable of any office in the custom-house.

The other public offices have likewise their settled fees, for the several branches of business transacted in them.

**FEE-ESTATE**, that held by the benefit of another, and for which some service, rent, or acknowledgment is paid to the chief lord, or superior, in whom the mere propriety of the soil always continues.

Fee is generally divided into absolute and conditional. Absolute, otherwise termed fee-simple, is where a person is seized of lands or tenements, to him and to his heirs for ever; whereas, fee-tail, or conditional fee, is where a person is seized of lands, with a limitation to him and the heirs of his body. A fee-simple is the largest estate a person can have, and can be conveyed by no other expression, but heirs for ever; yet, in a will, which is more favoured than a grant, the intention of the testator is more considered than the literal meaning of the words.

**FEE-FARM**, a kind of tenure without homage, fealty, or other service, except that mentioned in the feoffment; which is usually the full rent, or at least a fourth part of it.

The nature of this tenure is, that if the rent be behind, and unpaid for two years, then the feoffor and his heirs may have an action for the recovery of the lands.

**FEEL EXPECTANT**. See **EXPECTANT**.

**FEEDING** of fish. See **FISH**.

**FEELERS**, in natural history, a name used by some for the horns of insects. See the article **HORN**.

**FEELING**, one of the five external senses, by which we obtain the ideas of solid, hard, soft, rough, hot, cold, wet, dry, and other tangible qualities.

This sense is the coarsest, but at the same time, the surest of all others: it is besides the most universal. We see and hear with small portions of our body, but we feel with all. Nature has bestowed that general sensation wherever there are nerves, and they are every where, where there is life. Were it otherwise, the parts divested of it might be destroyed without our knowledge. It seems that upon this account nature has provided, that this sensation should not require a particular organization. The structure of the nervous papillæ is not absolutely necessary to it. The lips

of a fresh wound, the periosteum, and the tendons, when uncovered, are extremely sensible without them. These nervous extremities serve only to the perfection of feeling, and to diversify sensation.

Feeling is the basis of all other sensations. All the nervous solids, while animated by their fluids, have this general sensation; but the papillæ in the skin, those of the fingers in particular, have it in a more exquisite degree, so perfectly, that they convey some notice of the figure of the bodies which they touch.

The object of feeling is every body that has consistency or solidity enough to move the surface of our skin. It was necessary to perfect feeling, that the nerves should form small eminences, because they are more easily moved by the impression of bodies, than an uniform surface. It is, by means of this structure, that we are enabled to distinguish not only the size and figure of bodies, their hardness and softness, but also their heat and cold.

Feeling is so useful a sensation, that it supplies the office of the eyes, and in some sense indemnifies us for their loss.

**FEELING a horse**, in the manege, is of two sorts. 1. To feel a horse in the hand, is to observe, that the horse be under subjection, by obeying the bit. 2. To feel a horse upon the haunches, is to observe, that he plies or bends them.

**FEINT**, in music, the same with **diesis**. See the article **DIESIS**.

**FEINT**, in fencing, a shew of making a thrust at one part, in order to deceive the enemy, that you may really strike him in another.

A simple feint is a mere motion of the wrist, without stirring the foot.

**FELAPTON**, in logic, one of the six moods of the third figure of syllogisms, wherein the first proposition is an universal negative, the second an universal affirmative, and the third a particular negative.

**FELIN**, a town of Livonia, about an hundred miles north east of Riga.

**FELIS**, in zoology, is used by Linnæus, as the name of a large genus of quadrupeds, of the order of the fæx; the characters of which are these: the fore-teeth are small, obtuse, and equal; the tongue is furnished with prickles, all pointing backwards; and the feet are formed for climbing, with claws which may

may be drawn in or exerted at the creature's pleasure.

To this genus belong the lion, tiger, leopard, cat, cat of the mountain, lynx, and ounce. See LION, TIGER, &c.

**FELIS VOLANS**, the FLYING-CAT, an animal supposed to be the same with the flying squirrel. See SQUIRREL.

**FELIS ZIBETHICUS**, the CIVET-CAT: See the article ZIBETHICUM ANIMAL.

**FELKIRK**, a town of Aultria, in Germany, thirty-five miles south-east of Constance.

**FELLING** of timber. See TIMBER.

**FELLOWS**, in fortification, are six pieces of wood, each whereof form a piece of an arch of sixty degrees, and joined all together, by dulleges, make an intire circle; which with the addition of a nave, and twelve spokes, make the wheel of a gun carriage. Their thickness usually is the diameter of the ball of the gun they serve for, and their breadth something more.

**FELLOWSHIP**, or COMPANY, in arithmetic, is when two or more join their stocks, and trade together, dividing their gain, or loss, proportionably.

Fellowship is either with or without time. Questions without time, or in the single rule of fellowship, as it is frequently called, are wrought by the following proportion.

As the whole stock to the whole gain or loss, so is each man's particular stock to his particular share of gain or loss.

Example I. A, B, and C make a joint stock: A puts in 460l. B 510l. and C 480l. they gain 340l. what part of it belongs to each?

In order to the solution of this question, find the total of their joint stock, *viz.*

A's stock 460l. + B's stock 510l. + C's stock 480l. = 1450l. the total stock.

Then 1. To find A's share of the gain, state as follows: If 1450l. : 340l. :: 460l. which being worked by the rule of three, the answer will be 107l. 17s. 2½d. for A's share of the profit.

2. B's share of the gain, by stating thus, if 1450l. : 340l. :: 510l. and working by the rule of three, will be found to be 119l. 11s. 8½d.

3. C's share will appear 112l. 11s. 0¼d. when worked as before, after having stated thus. If 1450l. : 340l. :: 480l.

Ex. II. Suppose three partners, A, B, and C make a joint stock in this manner: A puts in 24l. B 32l. and C 40l. in all 96l. with which they trade, and gain 12l.

required each man's true share of that gain? The first operation for A's part of the gain will stand thus,

$$96l : 12l :: 24l : 3l = A's \text{ gain.}$$

$$96l : 12l :: 32l : 4l = B's \text{ gain.}$$

$$96l : 12l :: 40l : 5l = C's \text{ gain.}$$

Proof 3l. + 4l. + 5l. = 12l. the whole gain. That is, if the total of all their particular gains amounts to the whole gain, the work is true; if not, some mistake has been committed.

**FELLOWSHIP** *with time*, usually called the *Double Rule of Fellowship*, because every man's money is to be considered with relation to the time of its continuance in the joint stock. It is worked thus, multiply each man's stock by the respective time he puts it in for, and add all the products; the total of which must be your first number thro' all the statings: the gain or loss the second, as before; and each man's particular stock, multiplied by its time, the third.

Note, all the particular times (if not so given) must be reduced into one denomination, *i. e.* all years, all months, all weeks, or all days, &c. See REDUCTION.

Ex. 1. A put into company 560l. for eight months, B 279l. for ten months, and C 735l. for six months; they gained 1000l. What share of it must each have?

For the solution of this question, proceed as follows. A's stock 560l. × 8 its time = 4480, B's stock 279l. × 10 its time = 2790, C's stock 735l. × 6 its time = 4410. Then 4480 + 2790 + 4410 = 11680. Now, 1. To find A's share of the profit, state thus. If 11680l. : 1000l. :: 4480l. which being worked by the rule of three, the answer will be 383l. 11s. 2½d. for A's share of the gain.

2. For finding B's share, state thus, if 11680l. : 1000l. :: 2790l. and working as before directed, the answer will be 238l. 17s. 4¾d.

3. To find C's proportion of the gain, say, if 11680l. : 1000l. :: 4410l. then working it by the rule of three, the true amount of his share will appear to be 377l. 11s. 4¾d.

Ex. II. Three merchants, A, B, and C, enter into partnership thus; A puts into the stock 65l. for eight months; B puts in 78l. for twelve months; and C puts in 84l. for six months. With this joint stock they traffic, and gain 166l. 12s. 'Tis required to find each man's share of the gain proportionable to his stock and time of employing it.

1. A's stock 65l.  $\times$  8 months, the time it was employed = 520
2. B's stock 78l.  $\times$  12 months, the time it was employed = 936
3. C's stock 84l.  $\times$  6 months, the time it was employed = 504

The sum of all those products is 1960

Then, as before, the several proportions will stand thus :

1960:166,6::520:44l. 4s. for A's share.  
 1960:166,6::936:79l. 11s. 2½d. for B's share.  
 1960:166,6::504:42l. 16s. 9½d. for C's share.

The whole gain = 166l. 12s.

**FELL-WORT**, a plant more usually called gentian. See the article **GENTIAN**.

**FELO DE SE**, in law, a person that deliberately lays violent hands on himself, and is the occasion of his untimely death, whether by hanging, drowning, stabbing, shooting, or any other way.

It is a species of felony, of which infants, idiots, lunatics, and persons distracted by a disease, cannot be guilty, it being the willful and deliberate perpetration of self-murder, that constitutes this crime.

The goods and chattels, both real and personal, of a *felo de se*, are forfeited to the king : however, the jury frequently save the forfeiture, by finding their verdict lunacy ; to which they are inclined, on a favourable interpretation, that 'it is impossible for a person in his senses to do a thing so contrary to nature.

**FELON**, in law, a person guilty of felony. See the article **FELONY**.

**FELON-WORT**, in botany, the same with the solanum, or deadly nightshade.

**FELONY**, in law, a capital crime, next in degree to petit treason, and committed with an evil intention ; such are murder, theft, suicide, sodomy, rape, &c. See the articles **MURDER**, **THEFT**, &c. Felony is either by the common law, the civil law, or by statute.

Felony at common law is either against the life of a person, as murder, manslaughter, *felo de se*, and *se defendendo* ; against his goods, as larceny and robbery ; against his habitation, as burglary, arson, and house breaking ; or, lastly, against public justice, by breach of prison, rescue, and escape, &c.

Piracy, and robbery and murder on the sea, is felony both by the civil-law, and by statute. See the articles **MURDER**, **BURGLARY**, **ROBBERY**, &c.

There are usually reckoned two sorts of felony, one lighter, and such as for the first offence may be allowed benefit of clergy ; which the other, or greater, may not. See the article **CLERGY**.

Felony is punishable with loss of life and of lands not intailed, also of goods and

chattels. It also corrupts blood, unless the statute, making an offence to be felony, ordains it shall be otherwise, as some statutes do.

**FELT**, in commerce, a sort of stuff, deriving all its consistence merely from being fulled, or wrought with lees and fize, without either spinning or weaving.

Felt is made either of wool alone, or of wool and hair. Those of french make, 3½ yards long, and 1½ broad, for cloaks, pay each 2l. 14s. 1 800d. on importation, and draw back 1l. 12s. 3d. on exporting them again.

**FELTRI**, a town of Italy, subject to Venice, thirty-five miles north of Padua.

**FELUCCA**, in sea-affairs, a little vessel with six oars, frequent in the Mediterranean, which has this peculiarity, that its helm may be applied either in the head or stern, as occasion requires.

**FEMALE**, *fœmina*, a term peculiar to animals, signifying that sex which conceives and generates its young within itself. See **SEX** and **GENERATION**.

Females differ in many respects, besides sex, from males : in most quadrupeds they are smaller and weaker ; but, in birds of prey, the reverse of this generally holds. See the article **MALE**.

**FEMALE** is also applied, figuratively, to things without life, from the resemblance they bear to the females of animals : thus we say, a female screw, female flower, &c. See **SCREW**, **FLOWER**, &c.

**FEMME COVERT**, in law, a married woman. See the article **COVERTURE**.

**FEMME SOLE**, an unmarried woman, whose debts, contracted before marriage, become those of her husband after it.

A *femme sole* merchant, is where a woman, in London, uses a trade alone, without her husband, on which account she shall be charged without him.

**FEMININE**, or **FOEMININE**, in grammar, one of the genders of nouns. See the article **GENDER**.

The feminine gender serves to intimate that the noun belongs to the female. In latin, the feminine gender is most com-

monly distinguished by the article *hæc*, as it is in the greek by the article *ἡ*. In the french the article *la* commonly denotes this gender; but we have no such distinction by articles in the english language.

**FEMUR**, *os femoris*, in anatomy, the thigh-bone.

This is the longest and strongest bone in the whole human frame. In its upper extremity is to be observed a very large head, and in this head a cavity destined for the ligamentum rotundum, by means of which it is fixed in the acetabulum, and its luxation upwards prevented. To its neck is affixed a robust annular ligament, which contains the head and neck of the bone as it were in a case: it is observable, that the progress of this neck is not straight but oblique, nearly horizontal, and turning somewhat outward, being the contrivance of nature for keeping the thighs asunder, by which means we tread the firmer; and, by this situation of the neck of this bone also, several muscles have a much more commodious insertion than could otherwise have been possible.

Next, may be remarked the spongy cavernous structure of this extremity of the bone, by reason of which it is less liable to fractures, especially in this part: the apertures for the ingress of several vessels are also observable; and there are two apophyses, called trochanters, which serve for the insertion of the muscles of the thigh, and which, together with the head, become, before puberty, distinct epiphyses. In the lower extremity of the femur we observe two heads, with a cavity between them, for the articulation with the tibia; also a posterior cavity intended to give safe passage to the vessels of the tibia: there is, besides, an interior cavity, for the placing of the patella: and lastly, two condyles, or tubercles, placed near the heads, and serving for a fixed point to the origin of the muscles, which are to move the foot. In the exterior part of these we observe a peculiar depression, and often a single sesamoid bone; and sometimes there is also found another of these in the other tubercle: this usually, however, happens in old subjects. The whole extremity of the femur, is seen, quite to the age of puberty, a perfectly distinct epiphysis. In the body of the thigh-bone it is remarked that the anterior surface is convex, but the posterior somewhat concave: the obliquity of this part of the body is singular: its spine is remarkable, as is also its great cavity for containing

the marrow. The strength and firmness of this bone are surprisingly great; hence the use of the thigh-bone is to support and sustain the weight of the whole body, and its moveable articulation at the head gives way to the easy motion of the body, while the feet are unmoved.

**FEN**, a place overflowed with water, or abounding with bogs. See the articles **BOG** and **DRAINING**.

Fens are either made up of a congeries of bogs, or consist of a multitude of pools or lakes with dry spots of land intermixed, like so many little islands.

Several statutes have been made for the draining of fens, chiefly in Kent, Cambridgeshire, Bedfordshire, and Lincolnshire; and by a late act, 11 Geo. II. commissioners shall be appointed for the effectually draining and preserving of the fens in the isle of Ely, who are authorized to make drains, dams, and proper works thereon; and they may charge the landholders therein with a yearly acre-tax, and in default of payment sell the defaulter's lands.

**FENCE**, in country-affairs, a hedge, wall, ditch, bank, or other inclosure, made around gardens, woods, corn-fields, &c.

The chief reason why woodlands and plantations so seldom prosper, is in a great measure owing to the neglect of fencing them round, to keep out the cattle. This neglect prevails much in the northern parts of this island, though the use of fences is certainly more necessary there than in the south, as the lands require more shelter and warmth. There are several ways of fencing lands, but the usual is that of hedging it with either white or black thorn, crab, holly, alder, or furze, &c. See **HEDGE**.

But the best, and probably the cheapest, considering the duration and goodness of it, where flat stones are not to be had, is, in a grassy place, to dig turf, a spit or near a spit deep, the breadth of your spade, and about four or five inches thick: lay these turf with the grass outward, even by a line on one side, and on the backside of these lay another row of turf, leaving a foot space of solid ground on the inside, to prevent the bank from slipping in, if the ground should any way be faulty: on the outside of which you may make a ditch of what breadth or depth you please; or you may lower the ground on each side with a small slope, two feet deep, by which means you will have no loss of pasture by the fence, because it will bear grass on both sides. Then, with the

the earth that comes out of the ditches or sloped places, fill the middle of the bank level with the turf on each side, and then lay two more rows of turf upon the first, and then fill it again as before: this do, till your bank be four feet high, or of what height you please, only your foundation must be always broader the higher you raise it. You must observe on each side to give a small slope to the bank, so as to make the top about three feet wide, upon which plant quick, making on the top a little hollow, to keep as much of the rain to the quick as you can. Be sure to plant the quick about a foot or more in depth, by which means you will have a fence six feet high, besides the hedge on it, which will, in a very dry time, be always green on both sides, like a green wall, make a pleasant fence, and keep all sorts of cattle within their bounds.

In Devonshire they build two stone walls, first setting two edgeways, and then one between, and as it rises filling the interval or coffer with earth, to any height and breadth at pleasure. This is the neatest and most saving fence whatever, where they can be supplied with abundance of flatty stones. Upon these banks they not only plant quick-fets, but timber trees that thrive exceedingly.

In Cornwall the husbandmen secure their woods and lands with high mounds, on which they plant acorns, so that the roots of their sprouts bind in the lesser mould, and form a double and durable fence.

**FENCE-MONTH**, the month wherein deer begin to fawn, during which it is unlawful to hunt in the forest.

It commences fifteen days before midsummer, and ends fifteen days after it. This month, by antient foresters, is called defence-month. There are also certain fence-months, or seasons, for fish as well as wild beasts, as appears by stat. West. 13 Geo. II.

**FENCING**, the art of making a proper use of the sword, as well for attacking an enemy, as for defending one's self.

Fencing is a genteel exercise, of which no gentleman ought to be ignorant. It is learned by practising with foils, called in latin *rudes*. See the article FOIL.

According to Pyrrard, fencing is in so high repute in the East-indies, that the greatest noblemen and even princes teach it.

Fencing is either simple or compound.

Simple is that performed nimbly and off hand, on the same line. In this the

principal intention, in respect to the offensive part, should be to attack the enemy in the most unguarded part; and in the defensive, to parry or ward off the enemy's thrusts and blows. See the articles GUARD, THRUST, PARRYING, &c.

Compound fencing, on the offensive part, includes all manner of arts to deceive the enemy, by making him leave the part unguarded which we want to attack; such are feints, appeals, clashing and intangling of swords, half-thrusts, &c. And on the defensive, to parry and thrust at the same time. *Trevooux*.

An appeal is a simple thrust, made by beating with the right foot in the same place.

**FEND**, in the sea-language, imports the same as defend: thus, fending the boat, is saving it from being dashed to pieces against the rocks, shore, ship's sides. And hence

**FENDERS** are pieces of old hawfers, cable-ropes, or billets of wood, hung over the ship's sides, to keep other ships from rubbing against and injuring her.

**FENDER-BOLTS**, or FEND-BOLTS. See the article BOLT.

**FENDUE en pal**, in heraldry, a cross clove down in pale, that is, from top to bottom, and the two parts set at some distance from each other.

**FENESTRA**, in anatomy, a term applied to two openings or foramina within the ear, distinguished by the names of the oval and the round fenestra. The fenestra ovalis leads to the vestibule on which stands the stapes. The fenestra rotunda leads to the cochlea, and is closed by a membrane. See the articles EAR, STAPES, COCHLEA, &c.

**FENESTRELLES**, a town and fort of Piedmont, fifteen miles from Turin.

**FENNEL**, *fœniculum*, in botany. See the article FOENICULUM.

There are kept two very different sorts of fennel-seeds in the shops, called the common fennel-feed and the sweet fennel-feed. The common kind is of a sharp, biting, and pungent taste; whereas the sweet kind is not only larger and more beautiful, but of a pleasant aromatic sweetish taste, with nothing of the pungency of the other. Sweet fennel-feed is accounted carminative and attenuant, and considerably diuretic and sudorific, and recommended as a specific in the measles, small-pox, and malignant fevers. It is also an ingredient in many of the official compositions

compositions, and in the decoctions for clysters.

Fennel-roots are of the number of the five opening ones of the shops, and prescribed in the same intentions with the seeds. They are likewise said to be great antinephritics.

FENNEL-FLOWER, a plant known among botanists by the name of *nigella*. See the article *NIGELLA*.

FENNEL-GIANT, a plant also called *serula*. See the article *FERULA*.

Hog's FENNEL, the english name of the *peucedanum*. See *PEUCEDANUM*.

Sweet FENNEL, in botany. See the article *FINOCHIA*.

Scorbing FENNEL, a name given to the *thapsia*. See the article *THAPSIA*.

FENUGREEK, or FOENUGREEK. See the article *FOENUGREEK*.

FEOD, *feodum*, the same with fee. See *FE*.

FEODAL and FEODATORY. See the articles *FEUDAL* and *FEUDATORY*.

FEOFFMENT, in law, is a gift or grant of any manors, messuages, lands, or tenements to another in fee, that is, to him and his heirs for ever, by delivery of seisin, and possession of the estate granted. A deed of feoffment is the most antient conveyance of lands, and is said in some measure to exceed the conveyance by fine and recovery, because it clears all disseisins, abatements, intrusions, and other wrongful estates, which neither a fine, recovery, nor bargain and sale by deed indented and enrolled, does. It also bars the feoffor from all collateral benefit, in respect to conditions, powers of revocation, writs of error, &c. and destroys contingent uses. A feoffment however must not be made of such things, whereof livery and seisin may not be made; for no deed of feoffment is good to pass an estate, without livery of seisin: so that if either of the parties die before livery, the feoffment becomes void. Nevertheless a freehold may be granted without livery, on the statute of 27 Hen. VIII. by virtue of which a feoffment to the use of the feoffor or feoffee, supplies the place of livery and seisin.

A deed of feoffment is always applied to some corporeal and immoveable thing, and usually consists of the following parts, *viz.* the names and additions of the parties, the consideration, the granting part, the thing granted, the habendum or clause explaining for what estate or use it is granted, a covenant that the feoffor is seized in fee and has good right to grant,

that the feoffee shall quietly enjoy the premises free from incumbrances; and, lastly, a covenant for making further assurance with a letter or power of attorney to make livery and seisin.

FERÆ, in zoology, an order of quadrupeds, the distinguishing characters of which are, that all the animals belonging to it have six fore teeth in each jaw, and the canine or dog-teeth considerably long.

Under this order are comprehended several large genera, as the *ursus*, *felis*, *mustela*, *lutra*, *canis*, *phoca*, *meles*, *erinaceus*, *dasyus*, *talpa*, and *vespertilio*. See the articles *URSUS*, *FELIS*, &c.

FERÆ NATUREÆ, in law, signifies beasts and birds that are wild, as foxes, hares, wild-ducks, &c. in which no person can claim any property.

FERABATH, a port town of Persia, situated on the south coast of the Caspian sea: east lon. 50°, and north lat. 38°.

FERALIA, in antiquity, a festival observed among the Romans, on Feb. 21, or, according to Ovid, on the 17th of that month, in honour of the manes of their deceased friends and relations. During the ceremony, which consisted in making presents at their graves, marriages were forbidden, and the temples of the divinities shut up; because they fancied that during this festival, the ghosts suffered no pains in hell, but were permitted to wander about their graves, and feast upon the meats prepared for them.

FER DE FOURCHETTE, in heraldry, a cross having at each end a forked iron, like that formerly used by soldiers to rest their musquets on. It differs from the cross fourché, the ends of which turn forked, whereas this has that sort of fork fixed upon the square end. See plate *XCVI. fig. 2.*

FER DE MOULIN, *milrinde*, *inke de moulin*, in heraldry, is a bearing supposed to represent the iron-ink or ink of a mill, which sustains the moving mill-stone.

FERDEN, or VERDEN, a city of Germany, subject to Hanover; it is situated in lower Saxony, on the river Aller, twenty-six miles south-east of Bremen: east lon. 9°, and north lat. 53° 24'.

FERDWIT, a term formerly used to denote a freedom from going forth upon any military expedition; or, according to some, the being quit of manslaughter committed in the army.

FERE, a town of Picardy, in France, forty-two miles south-east of Amiens.

**FERE** is also a town of Champaign, about thirty miles north of Troyes.

**FERENTARII**, in roman antiquity, were auxiliary troops, lightly armed; their weapons being a sword, bow, arrows, and a sling.

There were another kind of *ferentarii*, who carried arms after the armies, and were ready to supply the soldiers in time of battle.

**FERETINO**, a city and bishop's see of Italy, about fifty miles east of Rome: east lon.  $14^{\circ} 5'$ , and north lat.  $41^{\circ} 45'$ .

**FERETTE**, a town of Alsace, subject to France, fifty-five miles south of Strasbourg.

**FERIÆ**, in roman antiquity, holidays, or days upon which they abstained from work.

It was a pollution of the *feriæ*, according to Macrobius, if the *rex sacrorum* or *flamines* saw any work done on them, and therefore they ordered proclamation to be made by the herald, that every one might abstain from work, and whoever transgressed the order, was fined. Nay, the same author informs us, that Mutius Scævola, the pontiff, was of opinion, that the breaking the *feriæ* was an unpardonable crime, unless it was done inadvertently, and in this case an expiation was to be made by sacrificing a hog.

The Romans had two kinds of *feriæ*: 1. The public, common to all the people in general. 2. The private, which were only kept by some private families.

The public *feriæ* were four-fold: 1. *Stativæ feriæ*, holidays which always fell out upon the same day of the month, and were marked in the calendar; of these the chief were the *agonalia*, *carmentalia*, and *lupercalia*. See the articles *AGONALIA*, *CARMENTALIA*, &c. 2. *Conceptivæ feriæ*, holidays appointed every year upon certain or uncertain days by the magistrates, or the pontiff; such were the *latiniæ*, *paganalia*, *compitalia*, &c. See the article *PAGANALIA*, &c. 3. *Imperativæ feriæ*, holidays commanded or appointed by the authority of the consuls or prætors; of this kind we may reckon the *lectisternium*. See *LECTISTERNIUM*. 4. *Nundinæ*, the days for fairs. See *NUNDINÆ*. The private *feriæ* were either confined to private families or particular persons, as birth-days; and those expiations upon the tenth day after a person died in a house, called *feriæ denicales*.

**FERIÆ LATINÆ** were instituted by Tarquinius Superbus, who having overcome

the Tuscans, made a league with the Latins, and proposed to them to build a temple in common to Jupiter Latialis, in which both nations might meet, and offer sacrifice for their common safety. At this festival a white bull was sacrificed, and each town, both of the Latins and Romans, provided a certain quantity of meat, wine, and fruits. At first the solemnity continued but one day; after the expulsion of the kings, the senate added a third, a fourth, and so on to ten days.

**FERIA**, in the romish breviary, is applied to the several days of the week; thus Monday is the *feria secunda*, Tuesday the *feria tertia*; though these days are not working days, but holidays. The occasion of this was, that the first christians were used to keep the easter-week holy, calling Sunday the *prima feria*, &c. whence the term *feria* was given to the days of every week. But besides these, they have extraordinary *feriæ*, viz. the three last days of passion-week, the two days following easter-day, and the second *feriæ* of rogation.

**FERIAL DAYS**, according to the statute 27 Hen. VI. cap. v. are taken for all days of the week except Sunday.

**FERM**, or **FARM**. See **FARM**.

**FERMANAGH**, a county of Ireland, in the province of Ulster, the chief town of which is Inniskilling.

**FERMENT**, any body which being applied to another, produces fermentation. See the article **FERMENTATION**.

Ferments are either matters already in the act of fermentation, or that soon run into this act. Of the first kind are the flowers of wine, yeast, fermenting beer, or fermenting wine, &c. and of the second are the new expressed vegetable juices of summer-fruits.

Among distillers, ferments are all those bodies which, when added to the liquor, only correct some fault therein, and by removing some obstacle to fermentation, forward it by secondary means; as also such as being added in time of fermentation, make the liquor yield a larger proportion of spirit, and give it a finer flavour. See the article **ADDITION**.

It appears that ferments are of use not only in beginning, but in regulating and determining the species of fermentation: thus fresh yeast determines the fermentation of wheat-flour, to make our common bread, which would prove of another kind with the flowers or lees of vinegar; and thus specific or determinate  
ferments

ferments have their correspondent effects. If sugar, honey, manna, treacle, or new wine be added to vinegar, themselves are soon changed into vinegar without stopping to make wine; because the acetous ferment or vinegar over-rules them; and so vinegar is soonest made in a cask that has before contained the same liquor. And if the best wine were put into a cask that had held putrified vinegar, the wine would not now make vinegar, but immediately run into corruption. So great and overruling a power have specific ferments; the use of which may afford considerable rules in chemistry, practical philosophy, and arts.

We recommend, therefore, to distillers to be careful in pitching upon a proper ferment, and also to consider its quantity, quality, and manner of operation. The quantity must be proportioned to that of the liquor, to its tenacity, and the degree of flavour it is intended to give, and to the dispatch required in the operation. As to the quality, it must be chosen perfectly sweet and fresh, for all ferments are liable to grow musty and corrupt; and if in this state they are mixed with the fermentable liquor, they will communicate their nauseous and filthy flavour to the spirit, which will scarce ever be got off by any subsequent refining. If the ferment be sour, it must by no means be used to any liquor; for it will give it an acetous instead of a vinous tendency. The ferment is to be put to the fermentable liquor in a state barely tepid, or scarce lukewarm. For the ferments most generally used, see the articles WINE-LEES, YEST, &c.

**FERMENTARIANS**, *fermentarii*, an appellation which those of the latin church have given to the Greeks, on account of their using leavened or fermented bread in the eucharist. The greek church, on the other hand, call the Latins azymites. See the article AZYMITES.

**FERMENTATION**, may be defined a sensible internal motion of the constituent particles of a moist, fluid, mixt or compound body; by the continuance of which motion, these particles are gradually removed from their former situation or combination, and again, after some visible separation is made, joined together in a different order and arrangement. The whole process then of fermentation, consists of two different operations, *viz.* an analytical one, whereby the particles are resolved; and a synthetical one, whereby

they are new ranged. And whenever these two different effects are found to be produced in direct sequence, the operation may be called by the name of fermentation, whether it happen in the blood or other animal, vegetable, or mineral substances. All separable, mixt, or compound bodies, may be the subjects of this operation; but the easier they are separable by means of water, air, and heat, the more readily they ferment. Thus the sweet or saccharine part of malt more readily dissolving in warm water, ferments easier than unmalted corn, which is more clammy, and will not dissolve so soon.

Fermentation, according to our later philosophers, arises from an inequality in the attractions of cohesion of the constituent particles of bodies. They distinguish it into two kinds, the one is that which happens when a solid is dissolved by a fluid; the other is, when two fluids being mixed together, ferment with each other. Dr. Friend and Keill are of opinion; that in order to cause a fermentation between a solid and a fluid, it is necessary, 1. That the particles of the solid attract those of the fluid with a greater force, than the particles of the fluid attract one another. 2. That the pores of the solid be not too small to admit the particles of the fluid into them. 3. That the body be of so loose a contexture, that the force of impact, with which the particles of the fluid rush into its pores, may be sufficient to disunite its parts. 4. That the elasticity of the particles tend to promote and augment the fermentation. Dr. Boerhaave makes also four conditions requisite, 1. That there be a due proportion between the size of the particles of the fluid, and the pores of the body to be dissolved. 2. That the figure of the particles of the fluid, have a determinate relation to that of the pores of the solid. 3. That the particles of the fluid be sufficiently solid, that their momentum or force of action may not be too weak. 4. That there be a fit disposition of the particles of the fluid, when received into the pores of the solid, to make some stay there and not immediately to pass through, but to act every way upon the solid, as they move towards the external surface thereof. Mr. Rowning thinks there is no occasion to have recourse to so many suppositions: if the particles of the solid (says he) attract those of the fluid with a greater degree of force than either those of



of the fluid or those of the solid attract one another, it is sufficient, and there will follow a dissolution of the body, as may clearly be demonstrated from the laws of mechanics, whatever the other circumstances relating to the figure or magnitude of pores, &c. may be. See Rown. Syst. of Nat. Phil. part II. Diff. VIII.

Fermentation is divided by chemists into many distinct species, particularly into vegetable, animal, and mineral. The vegetable kind again may be distinguished into vinous, acetous, and putrefactive; the vinous again into mucilaginous, mouldy, and putrefactive, and so of the acetous.

*Of vinous FERMENTATION.* The juice of the grape being chemically examined, proves to be no more than a large proportion of real sugar dissolved in water, with the addition only of a certain flavour in the juice of the grape, according to the nature of the vine; whence we may lay it down as an axiom, that a saccharine substance is the basis of wines; and indeed whoever would thoroughly enquire into the nature and means of improving vinous and acetous fermentation, cannot perhaps do better than to choose sugar for his subject; a chemical analysis of which will shew the principles necessarily required in this operation. These principles appear to be an acid salt, an oil, and earth so united together, as to be capable of dissolving perfectly in water. Experience shews us, that all fermentable bodies do not require ferments to begin their motion of fermentation. Raisins, we know, require none, much less does the fresh expressed juice of the grape, or other vegetable juices in the summer season, or in a warm air. But all sweet vegetable juices that have felt much of the fire, as treacle, wort high boiled, rob of malt, rob of elder, or the like, usually require a considerable proportion of vinous ferments to make them work. Water, we find, is absolutely necessary to begin and procure a fermentative motion in vegetable substances; for raisins and sugar being kept dry, will never ferment: and this holds universally of all the subjects of vinous and acetous fermentation. Whence water is an instrument that must be necessarily employed in these kinds of fermentation, whether natural or artificial. Warmth, with the free admission of the external air, is necessary to expedite the actions

of vinous fermentation; for if raisins and water were to stand either in a very cold place, or be kept intirely from the access of the common atmospherical air, either no fermentation, or a very slow and small one, would ensue, as has been often experienced. The lees remaining at the bottom of a cask where wine has fermented, will set any less fermentable subject at work, and determine its fermentation for the vinous kind. Whence it appears, that vinous fermentation consists, first, in an intestine struggle or commotion of the fluid; and, secondly, in a separation of a grosser part, which did not appear in that form before.

*Of acetous FERMENTATION.* The whole process of making vinegar being attentively considered, it is observable, that if wine were not bunged down when arrived at its vinous state, but suffered still to remain open and exposed to a warm air, it would spontaneously become vinegar; and the sooner, if a somewhat greater degree of heat than served for the making of wine, were employed. Acetous fermentation then requires a stronger heat than the vinous; and wines having once finished their fermentation, as wines, do not naturally stop there, but unless prevented, proceed directly on to vinegars; where again they make no stop, but unless prevented here also, spontaneously go on to vapidity, ropiness, mouldiness, and putrefaction: from which observation we would deduce this axiom, that, to speak philosophically, the intention and tendency of nature is to proceed from the very beginning of vinous fermentation directly in a continued series to putrefaction, and thence again to a new generation. See PUTREFACTION, &c.

If we examine the changes wrought upon vegetable subjects by vinous and acetous fermentation, we shall find that an inflammable spirit is produced by the action of vinous fermentation, from a vegetable subject and water, wherein no signs of any such spirit appeared before; inso-much, that this may be justly esteemed the criterion or inseparable effect of vinous fermentation; but that acetous fermentation, on the other hand, has a very different effect, and that it either conceals, alters, exhales, destroys, or some ways abolishes the inflammable spirit produced by the vinous fermentation. A part of this spirit is unquestionably exhaled by the heat employed in acetification, yet part also remains behind under a dif-

a different modification, so as to be recovered by art in an inflammable form, as we find by distilling the sugar of lead, which is only lead dissolved in spirit of vinegar. Having thus a criterion of acetous fermentation, as before we had of the vinous, (for if an acid unflammable liquor comes first by distillation over from a vegetable subject after fermentation, this will determine that fermentation to have been of the acetous kind) we are plainly led to allow of two very different kinds of fermentation in the same vegetable subject, and we make no doubt that some other species may be found upon due enquiry.

It has been disputed, whether animal bodies naturally undergo a fermentation after death; but supposing this not a dispute about words, it should seem that there is a proper species of fermentation peculiar to the animal subjects, as there is one peculiar to vegetables: and till this point be settled, we should not lay down vegetable fermentation as the test and standard of fermentation in general. For want of distinguishing in this case, all true fermentation seems denied to the blood and juices circulating in a living animal body, and, again, to the sap of vegetables. But, perhaps, were the enquiry into fermentation prosecuted in its full latitude, and not arbitrarily confined to any single species, many natural and artificial operations would prove to be actual fermentation. To say that there is no fermentation in the blood, because it affords no inflammable spirit upon distillation, is to say, in effect, that blood is not wine; whereas the question is not, whether there be a vegetable fermentation in the blood, but whether there be not an animal one; the criterion of which is the production of a volatile urinous salt, as the production of an inflammable spirit is the criterion of vinous fermentation.

Some of the processes in chemistry seem to prove, that fermentation is not confined to animal and vegetable substances, but that minerals are also liable to something of it. If an ounce of lead, and an ounce of bismuth be melted together in an iron ladle, and an ounce of quicksilver be heated in another ladle, and all three mixed together, this makes an amalgama, which appears perfectly uniform or homogeneous, and passes thro' leather in a running form. But this mixture being suffered to cool and stand

quiet for some hours, a gross matter will separate from it by degrees, and float upon the rest, which will now run easily through leather, and leave the gross metallic matter behind. Here then appears all the requisites of fermentation, a fluid form, an uniform matter, an intestine motion, and an actual separation of a grosser matter, leaving a thinner behind. There are many more instances of an apparent fermentation in mineral bodies; but this suffices to evince, that in a proper sense, there is an actual fermentation exercised not only in the vegetable and animal, but also in the mineral kingdom.

Upon the whole we may infer, 1. That the degrees of fermentation differ with the degrees of heat employed: thus vinous fermentation requires a less degree of heat than the acetous, the acetous less than the putrefactive, which last may consist with a degree of ignition. 2. That a particular kind of fermentation may be carried on in the bodies of living animals and vegetables, which are largely supplied with the requisite instruments of fermentation, *viz.* water, air, and heat; and in fact both animals and vegetables appear to have an intestine motion in all their circulating fluids, which continually deposit a grosser matter in the canals and parts they move through. 3. That when vegetables and animals die, there soon begins a different kind of fermentation in all their parts, tending not now to the repair, but to the entire destruction of their organical vessels. 4. That dry or solid substances, cannot in that state undergo a proper fermentation; for tho' they may in that state be separated into minute particles, yet they cannot range themselves together in any order, nor deposit a grosser matter without being agitated by some fluid, or, for some time, suspended therein.

We observed before, that heat, with a free admission and emission of the common air, were necessary to promote fermentation; the things which check or hinder it, are these: 1. The acid fume of burning sulphur, received in a large quantity at several times, and shut up along with the air, remaining on the top of the fermenting liquor. 2. Alkaline salts, if added in a large quantity to fermenting liquors, immediately excite a greater effervescence, which presently ceasing, all farther fermentation is stopped. But, in both these cases, the fermenting

menting liquor is spoiled. 3. The stopping up of the containing vessel so close, that nothing may escape or enter, provided the vessel be so strong as not to burst by the force of the confined liquor.

4. Too great a degree of cold stops all fermentation, which can scarce proceed with less than thirty-six degrees of heat.

5. Too great heat (it should not exceed ninety degrees) rather dissipates and throws off the active principles of fermentation, than excites and promotes them. 6. The extraction of the elastic air by means of the air-pump, and, lastly, a violent compression of the same air with the fermentable matter, entirely prevents the origin, and stops the progress of fermentation.

**FERMENTED**, in general, something that has undergone a fermentation. See the preceding article.

Fermented liquors are esteemed great antidotes to putrefaction; accordingly the abstinence from them is assigned as one cause why the Turks are more subject than other people to the plague, and other contagious distempers. It is likewise observed, that beer, wine, and spirituous liquors coming more into general use, has been one great means of suppressing putrid diseases. See **DRINK**.

The spirituous part, is the life of all fermented liquors; it keeps the whole together, and, in a manner, embalms and renders them durable, and not subject to corruption. It also, in a great measure, gives them that aromatic refreshing and restorative virtue, and the best effects they have on the human body.

**FERMO**, a port-town of Italy, situated on the gulph of Venice, about thirty miles south of Ancona. It is an archbishop's see.

**FERN**, *filix*, in botany. See **FILIX**.

Fern is very common in dry and barren places. It is one of the worst of weeds for lands, and very hard to destroy, where it has any thing of a deep soil to root in. In some grounds, the roots of it are found to the depth of eight feet. One of the most effectual ways to destroy it, is often mowing the grass, and if the field be ploughed up, plentiful dunging thereof is very good: but a most certain remedy for it is urine. However fern, cut while the sap is in it, and left to rot upon the ground, is a very great improver of land; for if burnt, when so cut, its ashes will yield double the quantity of salt that any other vegetable can do.

In several places in the north, the inhabitants mow it green, and burning it to ashes, make those ashes up into balls, with a little water, which they dry in the sun, and make use of them to wash their linen with; looking upon it to be near as good as soap for that purpose. It is said, that the frequent treading them down by sheep, while that sort of cattle feed upon them, is an infallible method of killing them.

The antients used the root of the fern and the whole plant, in decoctions and diet-drinks, in chronic disorders of all kinds arising from obstructions of the viscera, particularly in hypochondriac cases, and in obstructions of the spleen and pancreas. There are not wanting modern authors who give it as high a character in these cases as the antients have done, but it is an ill-tasted medicine, and in no great use in the shops. The country people esteem it as a sovereign remedy for that troublesome distemper the rickets in children, and they give it also as a powder, after drying it in an oven, to destroy worms.

*Sweet FERN*, a name by which some call the myrrhis, or wild chervil. See the article **MYRRHIS**.

**FERNAMBUC**, the same with brasil-wood. See the article **BRASIL**.

**FERNANDO**, or **FERNANDES**, an island in the Pacific ocean: west long. 83°, south lat. 33°.

**FERRA**, a truttaceous fish, much resembling a salmon: its usual length is a foot or more.

**FERRARA**, a city and archbishop's see of Italy: east long. 12° 6', north lat. 44° 50'.

**FERRARIA**, a name used for two distinct plants, agrimony and scrophularia.

**FERRE**, or *le FERRE*, a city of Picardy, in France, forty miles south-east of Amiens: east long. 3° 26', north lat. 49° 45'.

**FERRET**, *viverra*, in zoology, a quadruped of the mustela-kind. See the article **MUSTELA**.

The head is small and depressed; the snout sharp; the eyes look very fierce and red; the ears are short, patulous, and erect, they are considerably wide, especially towards the base; the mouth is large, and the teeth very sharp; the neck is short; the body is long and thin; the legs are short, and each divided at the foot into five toes, and there armed with sharp claws.

This animal is very frequent with us, but is a native of America. Our people use it in taking of rabbits; they plant nets at the mouth of the borrows, and turn in the ferret, after having muzzled him that he may not bite the rabbits, which are frightened by him out of their holes into the nets that are laid for them.

**FERRETS**, among glass-makers, the iron with which the workmen try the melted metal, to see if it be fit to work.

It is also used for those irons which make the rings at the mouth of bottles.

**FERRETTO**, in glass-making, a substance which serves to colour glass.

This is made by a simple calcination of copper, but it serves for several colours: there are two ways of making it, the first is this. Take thin plates of copper, and lay them on a layer of powdered brimstone, in the bottom of a crucible; over these lay more brimstone, and over that another lay of the plates, and so on alternately till the pot is full. Cover the pot, lute it well, place it in a wind furnace, and make a strong fire about it for two hours. When it is taken out and cooled, the copper will be found so calcined, that it may be crumbled to pieces between the fingers, like a friable earth. It will be of a reddish, and, in some parts, of a blackish colour. This must be powdered and sifted fine for use.

**FERRO**, west long.  $19^{\circ}$ , north lat.  $28^{\circ}$ , the most westerly of the Canary islands, near the african coast, where the first meridian was lately fixed in most maps; but now, the geographers of almost every kingdom make their respective capitals the first meridian, as we do London.

**FERRO**, some little islands situated in the northern ocean, 200 miles north-west of the Orcades, and as many south-east of Iceland: west long.  $7^{\circ}$ , north lat.  $63^{\circ}$ .

**FERROL**, a sea-port town of Spain, in the principality of Galicia, situated on a bay of the Atlantic ocean, twenty miles north-east of the Groyne, and fifty miles north of Compostella, a good harbour, where the spanish squadrons frequently secured themselves in the late war: west long.  $8^{\circ} 40'$ , north lat.  $43^{\circ} 30'$ .

**FERRUGINOUS**, any thing partaking of iron, or that contains particles of that metal.

It is particularly applied to certain mineral springs, whose waters are impregnated with the particles of iron, gene-

rally termed chalybeats. See the article **CHALYBEAT**.

**FERRUGO, RUST**. See the article **RUST**.

**FERRUM, IRON**. See the article **IRON**.

**FERRUMEQUINUM, HORSE-SHOEVETCH**, in botany, the same with the *hippocrepis* of Linnæus. See **HIPPOCREPIS**.

**FERRY**, a liberty by prescription, or the king's grant, to have a boat for passage, on a firth or river, for carrying passengers, horses, &c. over the same for a reasonable toll.

A ferry is in the nature of a common highway; and the not keeping it up has been held to be indictable.

**FERT SUR AUBE**, a town of Champaign, thirty miles south-east of Troyes.

**FERTILITY**, that quality which denominates a thing fruitful or prolific.

Nothing can produce fertility in either sex, but what promotes perfect health: nothing but good blood, spirits, and perfect animal functions, that is, high health, can beget perfect fecundity; and therefore, all means and medicines, all nostrums and specifics to procure fertility, different from those which procure good blood and spirits, are errant quackery. Dr. Cheyne says, that water-drinking males are very rarely infertile; and that if any thing in nature can prevent infertility and bring fine children, it is a milk and seed-diet persevered in by both parents.

To increase the fertility of vegetables, says lord Bacon, we must not only increase the vigour of the earth and of the plant, but also preserve what would otherwise be lost: whence he infers, that there is much saved by setting, in comparison of sowing. 'Tis reported, continues he, that if nitre be mixed with water to the thickness of honey, and after a vine is cut, the bud be anointed therewith, it will sprout within eight days. If the experiment be true, the cause may be in the opening of the bud, and contiguous parts, by the spirit of the nitre; for nitre is the life of vegetables.

How far this may be true, is not perhaps sufficiently shewn, notwithstanding the experiments of Sir Kenelm Digby and M. Homberg. Consult Mr. Evelyn's *Sylva*, the Philosophical Transactions, the french Memoirs, and Dr. Stahl's Philosophical Principles of Chemistry: but a proper set of accurate experiments seems still wanting in this view.

**FERULA, FENNEL-GIANT**, in botany, a genus of the *pentandria-digynia* class of plants;

plants; the compound flower of which is uniform, and the particular ones made up of five oblong and almost equal petals: the fruit is of an elliptical compressed figure, marked with three prominent lines on each side, and containing two seeds of the same figure. See plate XCVI. fig. 3.

Sagapenum is said to be the produce of a species of ferula. See SAGAPENUM.

**FERULA**, a little wooden pallet or slice, reputed the schoolmaster's sceptre, wherewith he chastises the boys, by striking them on the palm of the hand.

Under the eastern empire, the ferula was the emperor's sceptre, as is seen on variety of medals: it consisted of a long stem or shank, and a flat square head. The use of it is very antient among the Greeks, who used to call their princes ferula-bearers.

**FERULA**, in the antient eastern church, signified a place separated from the church, wherein the audientes were kept, as not being allowed to enter the church; whence the name of the place, the persons therein being under penance or discipline. This word was sometimes used to denote the prelate's crozier or staff. See the article CROZIER.

**FERULÆ**, in surgery, splinters or chips of different matter, as of wood, bark, leather, paper, &c. applied to bones that have been disjointed, when they are set again.

**FERULÆ** is also a word used by the antients, to express the horns growing on the deer or stag at the age of two years, at which early time those horns are unbranched.

**FESCENNINE VERSES**, in roman antiquity, satyrical verses, full of lewd and obscene expressions, sung by the company at the solemnization of a marriage.

**FESCHAMP**, a port-town of Normandy, thirty miles south-west of Rouen.

**FESSE**, in heraldry, one of the nine honourable ordinaries, consisting of a line drawn directly across the shield, from side to side, and containing the third part of it, between the honour-point and the nombril.

It represents a broad girdle or belt of honour, which knights at arms were antiently girded with. See plate XCVII. fig. 3.

**FESSE POINT**, is the exact center of the escutcheon. See the article POINT.

**FESSE WAYS**, or *in FESSE*, denotes any thing borne after the manner of a fesse;

that is, in a rank across the middle of the shield.

*Party per FESSE*, implies a parting across the middle of the shield, from side to side, through the fesse point.

**FESTI DIES**, in roman antiquity, certain days in the year, devoted to the honour of the gods.

Numa, when he distributed the year into twelve months, divided the same into the dies festi, dies profesti, and dies intercesi. The festi were again divided into days of sacrifices, banquets, games, and feriæ. See the articles SACRIFICE, EPULÆ, LUDI, and FERIÆ.

The profesti were those days allowed to men for the administration of their affairs, whether of a public or private nature: these were divided into fasti, comitiales, comperendini, statii, and præliares. See FASTI, COMITIALES, &c.

The intercesi were days common both to gods and men, some parts of which were allotted to the service of the one, and some to that of the other.

**FESTINO**, in logic, the third mood of the second figure of syllogism, the first proposition whereof is an universal negative, the second a particular affirmative, and the third a particular negative: as in the following example:

FES No bad man can be happy,

TI Some rich men are bad men:

NO *Ergo*, some rich men are not happy.

**FESTIVAL**, the same with feast. See the article FEAST.

**FESTOON**, in architecture and sculpture, &c. an ornament in form of a garland of flowers, fruits and leaves, intermixed or twisted together.

It is in the form of a string or collar, somewhat biggest in the middle, where it falls down in an arch; being extended by the two ends, the extremities of which hang down perpendicularly.

Festoons are now chiefly used in friezes, and other vacant places, which want to be filled up and adorned; being done in imitation of the long clusters of flowers, which the antients placed on the doors of their temples and houses on festival occasions.

**FESTUCA**, in botany, a genus of grasses, belonging to the *triandria-digynia* class; the flower of which is composed of two valves, and terminated by a straight arista or awn: the seed is single, of an oblong figure, very sharp-pointed at each end, and marked with a longitudinal furrow.

To this genus belong the capon's tail grass, wild oat grass, or drank, &c. which are said to be drying, and good against a stinking breath.

**FESTUCA** is also a name sometimes used for the bromus. See **BROMUS**.

**FETIPOUR**, a city of the hither India, twenty-five miles west of Agra: east long.  $78^{\circ} 40'$ , north lat.  $27^{\circ}$ .

**FETLOCK**, in the manege, a tuft of hair growing behind the pastern joint of many horses; for those of a low size have scarce any such tuft.

**FETUS**, or rather **FŒTUS**. See the article **FŒTUS**.

**FEUD**, *feodum*, the same with fee. See the article **FEE-ESTATE**.

**FEUDAL**, or **FEODAL**, denotes any thing belonging to a fee. See the article **FEE**.

**FEUDALARY**, or **FEODATARY**, a tenant who formerly held his estate by feudal service. See the article **VASSAL**.

**FEUD-BOTE**, a recompence for being concerned in a feud or quarrel.

**FEVER**, *febris*, in medicine, a disease, or rather class of diseases, whose characteristic is a preternatural heat felt through the whole body, or at least the principal parts of it. According to Sydenham, a fever is nothing else but the effort of nature, to free herself of some morbid matter, which she finds injurious, in order to establish a better health.

If any disease deserves the title of universal, it is a fever, because it disturbs the whole nervous system, and perverts all the functions of the body, inasmuch that the motion of the heart, arteries, and solids cease to be equal and just; the circulation of the blood and other fluids, to be free and natural; and the salutary secretions and excretions, to be regular; even the mind itself, when ruffled by the febrile onset, is affected with a delirium. Besides, this disease attacks all mankind, of what constitution, sex, or age, in all climates, let their diet and way of living be what they will: sometimes it is epidemic, and seizes many at a time. A fever is not always a primary disease, but is often the symptom of other maladies, as a cachexy, scurvy, phthisis, i. e. venerea, dropsy, &c. and renders them more cruel and dangerous: however, it is not always pernicious to the human race, but sometimes vanquishes its own cause, and supervening to other diseases, expels them out of the body: thus palsies, epilepsies, convulsions, spasmodic and hypochondriac af-

fections, have been cured by fevers; and many valetudinarians have, by a fever, been restored to a healthful and vigorous constitution.

Hence the most general and natural division of fevers, is into essential and symptomatic.

An essential fever is such whose primary cause lies in the blood itself, deriving its original from no other distemper of the solid parts, or any way depending on them; and this is absolutely speaking a fever properly so called.

A symptomatic is a secondary fever, which does not properly subsist of itself, but owes its origin to the disorder of some particular part, and most commonly depends on some remarkable inflammation; from whence proceed the variety of inflammatory fevers, peculiarly so called.

*The general causes of FEVERS.* "The cause of fevers is not heat alone, says "Hippocrates, *de vet. medic.* but heat "and bitterness together, heat and acidity, heat and saltness, and innumerable other combinations in the blood." It is found, nevertheless, by experience, that some persons, from sound and perfect health, where there has been neither a plethora or any cacochymical dispositions to cause it, have fallen into a fever; because, perhaps, some very extraordinary alteration in the air, or some great change in their way of living, or some considerable error in the six non-naturals, have happened. Sound bodies may, on such occasions, be seized with a fever, only to the end that their blood may acquire a new state and condition, thereby to accommodate itself to the alterations of the air, way of living, &c.

The formal or fundamental cause of a fever, consists in the spasmodic affection, of the whole nervous and fibrous genus which chiefly proceeds from the spinal marrow, and successively from the external to the internal parts: this plainly appears from the usual passions and phenomena of a fever. Hence it naturally follows; that whatever has a power to irritate and sollicit the nervous and vascular system to spasms, is most likely to generate a fever. To this class belong violent passions of the mind, especially terror and anger; a poisonous, subtle, caustic matter, either bred within the body, or received by infection; a stoppage of perspiration; a suppression of critical sweats; eruptions driven back; an abundance of purulent, ulcerous mat-

ter, adhering to various parts ; aliments over and above acrid and salt ; abuse of spirituous liquors ; corrupt and bilious crudities lodged in the primæ viæ ; excessive watching ; a violent pain and tension of the nervous parts ; inflammations ; tumours and abscesses ; hurting the nervous parts by sharp instruments ; acrid and corrosive drugs ; cold baths ; and, on the contrary, those that are too hot or astringent.

According to the different nature of these causes, and their various manner of affecting the nerves, arise fevers of divers kinds : some are benign, others malignant ; some are intermitting, others continual ; some are simple, others are compound ; some are regular, others anomalous ; others eruptive, spotted, putrid, hectic, or slow ; some admit of an easy cure, others a difficult ; some soon terminate, others are protracted a long time, and some again hurry the patient out of the world.

*The general signs of FEVERS* are a pain in the back, more particularly about the loins ; a coldness, especially of the extreme parts ; a shivering ; a shaking ; trembling ; a livid colour of the nails ; a subsidence of the vessels of the hands and feet ; a shrunk, dry skin ; a yawning ; a stretching ; a pale livid countenance ; a trembling and palpitating motion of the heart ; an anxiety of the præcordia ; difficult breathing ; inquietude, restlessness, a sensation of an ebullition of the blood about the heart ; a contracted, weak, small pulse ; a nausea, and an inclination to vomit ; a suppression of perspiration ; costiveness, with thin watry urine. When the symptoms are very urgent, and very hastily make their progress, the fever is called acute ; when they are more mild and gentle, it is denominated a slow fever.

*The general cure of FEVERS* is summarily comprehended in consulting the strength of nature, in correcting and discharging the acrimony from the blood, in dissolving gross humours, and expelling them, and in mitigating the symptoms. If we perceive the symptoms run high, and nature to grow exorbitant, we must moderate it, and enjoin abstinence, a slender diet, drinking water, bleeding, cooling clysters, &c. If nature seems to be too sluggish, she is to be excited by cordials, aromatics, volatiles, &c.

By how much the more acute a fever is, by so much the more sparing and slender

ought the diet to be. In fevers, though the patient lies many days without eating any thing, it is no matter : on the contrary, by eating and drinking, the fever would be exasperated.

Vomits in almost all fevers are of advantage, especially in the beginning. Even nature herself teaches us the use of sudorifics ; they are most beneficial when the signs of concoction appear ; and they are also useful through the whole course of the distemper ; yea, even by the promiscuous use of them, fevers are often cured. Spirit of sal armoniac, or its volatile salt, is esteemed an universal febrifuge, which, being given pretty often, seldom fails of success. All sugared things are very hurtful in fevers.

In acute and inflammatory fevers, but a very few medicines are required ; for it will be sufficient diligently to observe the ways that nature aims to relieve herself by, and to forward the cure in those ways, by assisting her. If there be any obstructions in the bowels, we are to take care, by proper evacuations, to remove the load, and by that means take away some of the fuel of the distemper. If the blood be too furiously agitated, we are to quell such an impetuosity : if it be embarrassed with gross and coagulated humours, we are to endeavour at dissolving it, and rendering it more fluid. In the due observation of these three precepts, consists, in a great measure, the whole cure of fevers, where the viscera are found, and the peccant humours are lodged in the blood, or in the primæ viæ ; and then, when nature tends to produce a crisis, or she has already begun it, we are altogether to refrain from the use of medicines, as much as we would avoid the plague.

They are grossly mistaken who, in acute and inflammatory disorders, make use of abundance of medicines so long, till nature, not knowing which way to turn herself, but being variously distracted to and fro, both by the violence of the distemper and the burden of the medicines, is at last forced to yield : for the orderly motion of nature being disturbed and distracted with the repetition of much medicines immethodically given, the fever is not lessened, and the crisis is postponed ; and the patient, exposed to a dubious event, either dies, or falls into a chronic distemper.

Therefore, since nature is the physician, it is a pernicious practice to suspend, suppress,

prefs, or destroy the febrile motions, which have a tendency to health. The most salutary work of nature ought rather to be promoted, which designs, by an increased progressive motion of the fluids, to correct, resolve, and at length to expel the morbid matter. And this is best performed by diluting, moistening, attemperating, apperient, corroborating and nitrous medicines; as also by those which in the time of the intermission, especially tend to promote the proper excretions. In all fevers, the drinking plentifully of warm weak liquors, is attended with many good consequences: the patient is always refreshed by it; the febrile heat is mitigated, and rest is promoted; and the proper and necessary sweats forwarded. Among these liquors, the common barley-water, teas made of sage, mint, baum, &c. with the milder alexipharmic roots, are most proper: with these, powders are to be given, composed of the absterfive and digestive salts: they should be fated with lemon-juice, and then mixed with a little nitre, and may be given every three, four, or six hours, as the urgency of symptoms require. Emulsions of sweet almonds, and the cooling seeds, are also very proper between whites.

The medicines by which the physician is to assist nature in her business of excretion, are the gentle diaphoretics; among which the diaphoretic antimony, when truly prepared, holds a very high place: alexipharmics, which have also a diuretic virtue, such as the mixtura simplex, when faithfully prepared and lightly camphorated, are very proper. All violent medicines are to be dreaded in fevers. Acids, in general, are by many much dreaded, but there is no real ground for this; on the contrary, in sanguineous fevers, during the time of the violent heat, and immoderate thirst, they are found of the greatest use and benefit. The use of astringent medicines, though too common, yet is extremely improper in all fevers. Nitre is an admirable remedy for fevers in general.

*The general crisis of FEVERS.* Whereas there is no fever cured without some considerable evacuation, raised either by nature or by art, the physician ought carefully to observe which way nature seems to intend the expulsion of the morbid matter, and assist her by all possible means. Now this expulsion is frequently made through several outlets of the body at a time, and an evacuation

by one outlet, more or less, checks that by another: thus a looseness checks sweat, and *vice versa*. Wherefore it is the physician's business to consider what evacuation is most likely to be of service, and so to promote this, as to give the least interruption possible to any other, for any one evacuation is not equally suitable to all persons, both on account of the difference of constitutions, and of diseases; although evacuations thro' every emunctuary, are sometimes necessary, as we find by experience in malignant fevers.

But of all solutions of the disease, the most desirable is by sweat; next to that, by stool and urine: the worst is by a hæmorrhage, whether it proceeds from the nose or from any other part, because it indicates that the blood is so far vitiated, that no proper separation of the humour can be made.

Lastly, some fevers terminate in abscesses, formed in the glands, which, if they happen in the decline of the disease, and suppurate kindly, are salutary. Wherefore the suppuration is to be forwarded by cataplasms, or plasters; and sometimes by cupping on the tumor; and then, if the abscess don't break spontaneously, it ought to be opened, either with a knife, or with a caustic. At this time this rule of practice is generally right, not to exhaust the patient's strength by evacuations of any kind. And yet in some cases there is a necessity for drawing a little blood, as when the humours are in great commotion, and the heat excessive: for this remedy prudently administered, makes the tumor ripen kindly, because nature has always a great abhorrence of a turbulent state. But in order to give a more distinct notion of the several kinds of fevers, it will be necessary to treat them particularly.

*Bilious FEVER.* See the article *BILIOUS*.

*Burning FEVER*, CAUSUS, attacks the patient with great fury and rage, with an excessive burning heat, an intolerable thirst, and other symptoms demonstrating a great and remarkable inflammation of the blood: the respiration is thick, difficult, and quick; the tongue is dry, yellow, parched and rough; there is a loathing of food, a nausea and vomiting, a little cough, a delirium, a coma, convulsions, and other general symptoms already mentioned.

On the third and fourth day it often proves



proves mortal; it seldom exceeds the seventh, if violent.

It is often terminated by a hæmorrhage, which, if small on the third and fourth day, is a fatal sign. A solution of this fever, on a critical day, may also be by vomiting, stool, sweat, urine, and spitting thick phlegm. If the exacerbation of this disease happens on the second or fourth day, it is a bad sign, on the sixth not so bad.

As to the cure of a burning fever, so far as it differs from the general treatment already prescribed, bleeding is necessary at the beginning, if there is a plethora, or signs of particular inflammation; or the heat intolerable, or the rarefaction too great, or a revulsion necessary, or the symptoms urgent, and not to be vanquished any other way.

Soft, diluting, laxative, antiphlogistic, cooling clysters, are to be repeated as oft as the heat, costiveness and revulsion requires them; the whole body is to be moistened by receiving into the nostrils the steam of warm water, by washing the mouth, throat, feet, and hands with the same; and by fomenting with warm sponges the places where the vessels are most numerous. Purgatives are dangerous before the crisis, but clysters may be used made of milk, honey, and a little nitre. After the crisis, which is known by the sediment of the urine, laxatives made with tamarinds, manna, rhubarb, raisins, or cream of tartar, are necessary. If a phrensy happen, cause bleeding of the nose, by thrusting up a straw, or with a scarifying knife: use also frictions of the feet and legs, with hot cloths.

*Catarrhal* FEVER may be reckoned in the class of slow fevers, which, in the beginning, is attended with a catarrh, a coryza, cough, hoarseness, &c. These fevers are most commonly gentle and flow by day-time, generally somewhat worse in the evenings: they are attended with a great weariness of the limbs, the symptoms continue with an increase of the coryza and cough, until the distemper arises to its highest pitch, when the matter of the catarrh is ripened, and the mucus, becoming thicker, is discharged, and the fever ceases: the seat of this distemper is in the conglobate glands.

In a catarrhal fever a decoction of saffras wood is convenient, with liquorice roots and raisins, on account of the acrimony of the humours. Also the ex-

pressed juice of turnips, with a little sugar; volatiles and sudorifics, a solution of gum ammoniac; and for the further treatment of this disorder, see the article CATARRH.

*Colliquative* FEVER is that in which the body is much emaciated and consumed in a short space of time, the solid parts, and the fat itself wasted, sometimes by a diarrhœa, sometimes by sweat, by urine, or by feverish heats alone, without any sensible discharge. A colliquative fever is observed to accompany a cancer of the breast, with a diarrhœa. See the articles DIARRHOEA, DIABETES, CANCER, &c.

For this disease, emulsions of almonds, and of the four cold seeds, as also ass's, goat's, or woman's milk, are proper; or cow's milk with the juice of watercresses; chicken broth, broth made of river crabs, or wood snails bruised.

*Continual* FEVER, the same with synochus.

See the article SYNOCHUS.

*Diary* FEVER, the same with ephemera.

See the article EPHEMERA.

*Epidemic* FEVER. See EPIDEMIC.

*Eruptive* FEVER. See the articles MILIARY FEVER, ERISYPELAS, &c.

*Gaol or Camp* FEVER. See GAOL.

*Hætic* FEVER. See HECTIC FEVER.

*Hospital* FEVER. See HOSPITAL.

*Hypochondriac* FEVER. See the article HYPOCHONDRIAC.

*Inflammatory* FEVER. See the article INFLAMMATORY.

*Intermitting* FEVER. See the articles QUOTIDIAN, TERTIAN, &c.

*Malignant* FEVER. See MALIGNANT.

*Mesenteric* FEVER. See MESENTERIC.

*Miliary* FEVER. See MILIARY.

*Milk* FEVER. See the article MILK.

*Nervous* FEVER, at first, affects the patient with a slight, transient chillness, several times in a day; also with uncertain flushes of heat, a listlessness, lassitude, and weariness.

The patient has a dryness of the lips and tongue, without any considerable thirst: they have frequent nausea, with reaching to vomit, but little brought up: the breathing is difficult by intervals, and especially towards night: there is an exacerbation of the symptoms, with a low, quick, and unusual pulse: the urine is pale, and made often, and suddenly; a torpor or obtuse pain, and coldness often affect the hind part of the head, or a heavy pain is felt along the coronary suture. The pulse is very remarkable.

markable in this disease, for it is generally low, quick and unequal.

Gilchrist makes this state previous to the fever, and says, that for a fortnight, or three weeks, before they are laid down, they shall be low-spirited, inappetent, loaded, sleep ill, sigh frequently, groan involuntarily, and feel unexpressible disorder, accompanied with fear, concern, and dejection, and perhaps slight alienations of mind. The same author says, that this disorder is frequently occasioned by people exposing themselves indiscreetly to the sun, or by being fatigued in it; by eating largely of fruit, or drinking bad wine; or by being long under a course of anxiety, care, fear, discouragement, and other enervating passions, together with irregularities of diet, &c. It commonly attacks people of weak nerves, and a lax habit of body, and is occasioned by an acrimony that gives an universal stimulus.

The cure is to be performed with gentle volatile medicines of the cordial and diaphoretic kind, in order to promote perspiration, by the application of blisters, and by a proper regimen and method of diet. In the beginning a gentle emetic may be given, or a small dose of rhubarb; when it has continued long, bleeding and sweating is very prejudicial. In giving the diaphoretic, we should always have regard to the urine, for if that from being pale, gradually heightens to an amber colour, we are right in our dose, especially if, in bed, a gentle dew or moisture comes on, without a restlessness. A little chicken broth is of service, both as food and physic, especially towards the decline of the disorder. Also, thin jellies of hartshorn, sago, panado, adding a little wine to them; at this time also, if the sweats are copious and weakening, 'tis proper to give small doses of the tincture of the bark, with saffron and snake-root, interposing now and then a dose of rhubarb, to carry off the putrid colluvies.

**Peripneumonic FEVER.** See the article **PERIPNEUMONY**.

**Pesilential FEVER.** See **PLAGUE**.

**Petechial FEVER.** See the articles **PETECHIAL** and **MALIGNANT**.

**Pituitous FEVER,** the same with catarrhal *supra*.

**Remitting FEVER.** See **REMITTING**.

**Scarlet FEVER.** See **SCARLET**.

**Scorbutic FEVER.** See **SCORBUTIC**.

**Slow FEVER,** much resembles the hectic fever, but has milder symptoms, and a

gentler heat than the hectic. See the article **HECTIC**.

This fever is attended with profuse sweats after sleeping; after which, and before noon, the pulse is natural, as in the hectic; but there is not such a want of appetite, nor excessive weakness, nor dryness of the skin, nor such dark coloured urine, nor such danger, as in the hectic.

The cause of a slow fever lies mostly in the fluids. It arises from obstinate intermittent, or continual fevers; from the small-pox and measles; from profuse hæmorrhages; from long diarrhoeas, dysenteries; from an excessive salivation, gonorrhœa, or fluor albus; from care, watching, intense study, hard, continual labour, inordinate coition, or the abuse of spirituous liquors. In the cure of this disease respect must always be had to the cause. If it proceeds from crudities, it is known by a languid feebleness, internal heat, propensity to sweat, especially in the balls of the hands, and soles of the feet; in which case the stomach and parts adjacent must be cleansed from the fœces by a gentle vomit of ipecacuanha. After the alimentary canal is cleansed, you must proceed to analeptics and stomachics.

If the disorder is in the hypochondria, when the patient is plethoric, cacochymical, cachectical, or scorbutical, or the menses or hemorrhoidal evacuations are stopped, and occasion this disorder; or, if it proceeds from voraciousness, or bad diet, or the abuse of spirituous liquors, then endeavours must be made to free the liver, spleen, and mesentery, and its vessels and glands from obstructions: for this purpose mineral waters are proper; as are also the thermæ, or hot bath waters. Where these cannot be had a decoction of thin veal broth, with the roots of succory, fennel, asparagus, dog-grass, and viper's grass, are proper; drinking a quart a day for some weeks; and before it some preparations of steel, as the tincture of steel, or of martial flowers. If from an erosion of the stomach and bowels, all sharp, salt, and stimulating things are as bad as poison. In this case a decoction of saffraas, and the bark of Eleutherius in milk, as also chamomile flowers, and the tops of yarrow, drank about a quart a day, are of great use: as are also the root of marshmallows, or rice boiled in milk; or gum dragant, dissolved in water.

If from the loss of necessary fluids, and want of strength, then it may be termed a colliquative fever, and must be treated as already directed in the treatment of that fever, above.

If it proceeds from the abuse of spirituous liquors, all heating liquors should be avoided, as also analeptics and stomachics. Gruel will be proper, with succory root, red poppy flowers, and some stibiated nitre.

If this fever proceeds from a suppression of the menses, it requires immediate bleeding in the foot, and resolvent decoctions of succory-roots, leaves of sow-thistles, daisies, and elder-flowers, forbearing all strong emmenagogues.

If from a marasmus senilis, and that the patient has been addicted to a sedentary inactive life, his appetite remaining good, and has omitted accustomed bleeding, or the spontaneous evacuations of blood are ceased, bleeding is indicated, and wholesome diluters must be freely drank, abstaining from food of too plentiful nourishment, and using convenient exercise: but if the disorder proceeds from a plenty of impure salt serum, not secreted thro' the skin, or otherwise, the fordes must be carried off by gentle laxatives of manna, rhubarb and raisins, and the roscid juices must be renewed by jellies and ass's milk.

*Synochus* FEVER. See *SYNOCHUS*.

*Yellow* FEVER. See the article *BILIOUS FEVER*.

*FEVERS of Children* are all owing to acidity, the primary cause of all the disorders that affect them; and the whole cure depends upon vanquishing that enemy. This is to be done two ways, the first is to prepare the acidity, and render it fit for expulsion; and then to purge it away by suitable evacuates. To prepare the acid does not require sudorifics, but absorbents; and though these are numerous, the powder of crab's claws is the chief. Purging to some may seem dangerous, but Sydenham has shewn us, that it is safe and salutary in the fevers of adults, inasmuch that he depends entirely upon it for the cure of the epidemic winter-fever; and it has been found of excellent use in the fevers of children. They recommend in this case a pearl julep, made by adding a dram of prepared pearls to two ounces of the simple waters, and two drams of the compound; the dose is three spoonfuls. When there is any unusual symptoms

arising from putrid humours, they prescribe about six grains of æthiops mineral the night before the purge, in a small spoonful of any agreeable syrup. After the purge, the testaceous powders are to be given three or four times in twenty-four hours for two days and nights, and then the purge is to be repeated.

*FEVERFEW*, the english name of a plant, called by botanists *matricaria*. See the article *MATRICARIA*.

*Bastard*-FEVERFEW. See *PARTHENIUM*.

*FEVERSHAM*, a port-town of Kent, and one of the cinqueports. See the article *CINQUEPORT*.

It stands seven miles west of Canterbury.

*FEUILLANS*, an order of bare-footed monks, who observe the same rules with the bernardines. See *BERNARDINES*.

*FEUILLE DE SCIE*, among the french heralds, imports that an ordinary, as a fesse or a pale, is indented only on one side; so called on account of its resemblance to a saw-blade, as the words signify.

*FEVILLEA*, in botany, a genus of the *monoecia syngenesia* class of plants, the flower of which is monopetalous, divided into five segments at the limb, and rotated: the fruit is a very long fleshy berry, with a hard rind, and containing compressed orbicular seeds. It is called by Plumier, *nhandiroba*.

*FEURS*, a town of France, situated on the river Loyre, twenty-seven miles west of Lyons.

*FEWEL*, or *FUEL*. See the article *FUEL*.

*FEWMET*, or *FUMET*. See *FUMET*.

*FEZ*, the capital of the empire of Fez and Morocco, in Africa: west long. 6°, north lat. 33° 30'.

It is a large and populous city, and the usual residence of the emperor. See the article *MOROCCO*.

*FIASCO*, a city and bishop's see of Italy, about twelve miles south of Orvietto.

*FIAT*, in law, a short order or warrant signed by a judge, for making out and allowing certain processes.

*FIAT JUSTITIA*, is where the king, on a petition to him for his warrant to bring a writ of error in parliament, writes on the top of it *fiat justitia*, let justice be done; upon which the writ of error is made out.

*FIBER*, the *BEAVER*, in zoology, is made, by Linnæus, a species of *castor*. See the article *CASTOR*.

**FIBRARIÆ**, a class of fossils, naturally and essentially simple, not inflammable nor soluble in water, and composed of parallel fibres, some shorter, others longer; their external appearance being bright, and in some degree transparent: add to this, that they never give fire with steel, nor ferment with, or are soluble in acid menstrua.

To this class belong the asbestos, amiantus, tricherizæ, and lachnides. See the articles **ASBESTUS**, **AMIANTHUS**, &c.

**FIBRE**, in anatomy, a perfectly simple body, or at least as simple as any thing in the human structure; being fine and slender like a thread, and serving to form other parts. Hence some fibres are hard, as the bony ones; and others soft, as those destined for the formation of all the other parts.

The fibres are divided also, according to their situation, into such as are straight, oblique, transverse, annular, and spiral; being found arranged in all these directions, in different parts of the body, for an account of which see **BONE**, **MUSCLE**, **NERVE**, **ARTERY**, **VEIN**, &c.

**FIBRE** is also used to denote the slender filaments which compose other bodies, whether animal, vegetable, or mineral; but more especially, the capillary roots of plants. See **PLANT**, **WOOD**, &c.

**FIBRILLA**, a term sometimes used for a very minute or slender fibre.

**FIBROSE**, something consisting of fibres, as the roots of plants. See **ROOT**.

**FIBULA**, in anatomy, the outer and smaller bone of the leg, called also perone. It is nearly of a triangular figure, and stands parallel to, but distant from the tibia, or inner bone of the leg. Its upper extremity does not reach to the os femoris, but is only joined to the external side of the tibia; and its lower extremity, called malleolus externus, concurs in the articulation of the tarsus, which its eminence serves to strengthen, by rendering a luxation less easy. It has no particular motion of its own, but wholly follows that of the tibia.

**FIBULÆUS**, a muscle of the leg, more usually called peronæus. See **PERONÆUS**.

**FICARIA**, in botany, the name by which Dillenius calls a species of ranunculus, called by Boerhaave chelidonium minus. See the article **RANUNCULUS**.

**FICEDULA**, in ornithology, a name given to several species of motacilla, particularly the brown kind, with a spotted breast, and white belly. See **MOTACILLA**.

**FICHE'** or **FITCHE'E**, in heraldry. See the article **FITCHE'E**.

**FICOIDEA**, a genus of the *polyandria-pentagynia* class of plants, without any flower-petals: the fruit is a ventricose, pentagonal capsule, consisting of five cells, wherein are contained a great many roundish seeds. The essential characteristic of the genus consists in this, that the stamina are inserted in series in the sinuses of the cup, usually three in each series.

**FICOIDES**, a name given to several distinct plants, as the mesembryanthemum musa, and opuntia. See the article **MESEMBRYANTHEMUM**, &c.

**FICTION**. See the article **FABLE**.

**FICUS**, the **FIG-TREE**, in botany, a genus of the *cryptogamia* class of plants, producing male and female flowers separate, neither of which have any flower-leaves: the stamina are three setaceous filaments, of the length of the cup; and the fruit is large, fleshy, and of a turbinated figure; being properly nothing but the common calyx or cup of the fructification. See the article **FIG**.

**FIDA**, a town on the slave-coast of Guinea: east long. 3°, and north lat. 6°.

**FIDD**, in the sea-language, an iron, or wooden pin, to splice and fasten ropes together. It is made taper-wise, and sharp at one end. The pin in the heel of the top-mast, which bears upon the cheffe-trees, is likewise called a fidd.

**FIDD-HAMMER**, one whose handle is a fidd, or made taper-wise.

**FIDDLE**, or **VIOLIN**. See **VIOLIN**.

**FIDE JUSSOR**, among civilians, the same with a surety. See **SURETY**.

**FIDEI COMMISSUM**, in roman antiquity, an estate left in trust with one person, for the use of another. See **TRUSTEE**.

**FIDICINALES**, muscles of the fingers, otherwise called lumbricales. See the article **LUMBRICALES**.

**FIEF**, or **FEE**. See the article **FEE**.

**FIELD**, *campus*, in agriculture, a piece of ground inclosed, whether for tillage or pasture. See **TILLAGE** and **PASTURE**.

The square contents, or superficies, of a field may be easily found, by the rules of surveying. See **SURVEYING**.

**FIELD**, in antiquity, the same with *campus*. See the article **CAMPUS**.

**FIELD**, in heraldry, is the whole surface of the shield, or the continent, so called because it containeth those achievements antiently acquired in the field of battle. It is the ground on which the colours, bearings,

bearings, metals, furs, charges, &c. are represented. Among the modern heralds, field is less frequently used in blazoning than shield or escutcheon. See the article SHIELD, &c.

**FIELD**, in a military sense, denotes the place where a battle was fought.

*Close FIELD* was antiently a place railed in with a barrier, for the performance of jousts and tournaments.

**FIELD**, among painters, is more usually called ground. See the article GROUND.

**FIELD-BOOK**, in surveying, that wherein the angles, stations, distances, &c. are set down. See SURVEYING.

**FIELD-COLOURS**, in war, are small flags of about a foot and half square, which are carried along with the quarter-master general, for marking out the ground for the squadrons and battalions.

**FIELD-FARE**, in ornithology, the english name of the variegated turdus, with a hoary head. See the article TURDUS. It is larger than the common black-bird, and with us is a bird of passage, coming over in great numbers in winter. See plate XCVII. fig. 4.

**FIELD-FORT**, in fortification. See FORT.

**FIELD-OFFICERS**, in the art of war. See the article OFFICER.

**FIELD-PIECES**, small cannons, from three to twelve pounders, carried along with an army in the field. See CANNON.

**FIELD-STAFF**, a weapon carried by the gunners, about the length of a halbert, with a spear at the end; having on each side, ears screwed on, like the cock of a match-lock, where the gunners screw in lighted matches, when they are upon command; and then the field-staffs are said to be armed.

**FIELD-WORKS**, in fortification, are those thrown up by an army in besieging a fortress, or by the besieged to defend the place. Such are the fortifications of camps, highways, &c.

*Elysian FIELDS*. See ELYSIAN.

**FIERENZUOLO**, a town of Italy, ten miles south-east of Placentia.

**FIERI FACIAS**, in law, a writ that lies where a person has recovered judgment for debt or damages in the king's courts against one, by which the sheriff is commanded to levy the debt and damages on the defendant's goods and chattels. This writ must be sued out within a year and a day after the judgment obtained, and where two fieri facias's against one person are delivered to the sheriff the same day, he ought to exe-

cute that first which was first delivered; but if he executes the last first, the execution will be good, though the other party in such case may have an action against him.

**FIFE** in music, is a sort of wind-instrument, being a small pipe. See PIPE.

**FIFE**, in geography, a county of Scotland bounded by the Frith of Tay on the north; by the German sea on the east; by the Frith of Forth on the south, and by Menteeth and Sterling on the west.

**FIFE-RAILS**, in a ship, are those that are placed on banisters, on each side of the top of the poop, and so along with hances or falls.

They reach down to the quarter-deck, and to the stair of the gang-way.

**FIFTEENTH**, an antient tribute or tax laid upon cities, boroughs, &c. through all England, and so termed because it amounted to a fifteenth part of what each city or town had been valued at; or it was a fifteenth of every man's personal estate according to a reasonable valuation. In Doomsday book, there are certain rates mentioned for levying this tribute yearly; but since, any such tax cannot be levied but by parliament.

**FIFTH**, in music, one of the harmonical intervals or concords. See the article INTERVAL.

The fifth is the second in order of the concords, the ratio of the chord that affords it is 3 : 2. See the articles CHORD and CONCORD.

It is called fifth, as containing five terms or sounds between its extremes, and four degrees, so that in the natural scale of music, it comes in the fifth place or order from the fundamental. The antients called this fifth diapente. The imperfect and defective fifth called by the antients semi-diapente is less than the fifth by a lesser semitone. See the articles DIAPENTE, SEMITONE, &c.

**FIG**, the fruit of the ficus, or fig-tree. See the article FICUS.

Figs, as well fresh as when dry, are very wholesome food: they are nutritive and emollient: they are good also in the disorders of the breast and lungs; but it is to be observed, that a too free use of them has sometimes brought on obstructions of the viscera, which are very common complaints also where they are eaten as food, as they are with bread by the poor people in many parts of the Levant. They are frequently made

ingredients in our pectoral decoctions, and are by some greatly recommended against nephritic complaints. They are much used externally by way of cataplasin, either roasted or boiled in milk, for the ripening of tumours, and for easing the pain of the piles. Figs should be chosen large, of a pale brownish colour, soft and mellow, heavy, and when broken, with the pulpy substance yellowish and sweet, and of a soft glutinous texture.

Figs the hundred weight pay on importation 9s. 6<sup>10</sup>/<sub>16</sub>d. the drawback on exportation is 8s. 9d. at the rate of 6l. the hundred weight.

**FIG**, in farriery, a sort of wart on the frush, and sometimes all over the body of a horse. The figs that appear on the frush or sole make an evacuation of malignant stinking humours that are very hard to cure.

**FIG-SHELL**, a species of dolium. See the article **DOLIUM**.

**FIGWORT**, a plant called by the botanists **SCROPHULARIA**. See **SCROPHULARIA**.

**Indian FIG**, } See } **OPUNTIA**.

**Infernal FIG**, } See } **ARGEMONE**.

**Marygold FIG**. See **MESEMBRYANTHEMUM**.

**Pharaoh's FIG**. See **MUSA**.

**FIGHT**, or **Sea-FIGHT**. See **BATTLE**.

**Running-FIGHT**, that in which the enemy are continually chased.

**FIGHTS**, in a ship, are the waste clothes hung round about a ship in a fight, to keep the men from being seen by the enemy.

**Cloze FIGHTS**, the bulk-heads, fore and aft the ship, put up for the men to stand secure behind in case of boarding, and fire upon the enemy.

**FIGHTWITE**, a fine or mulct for fighting or creating a quarrel.

**FIGUERRE**, a town of Catalonia in Spain, ten miles west of Roses.

**FIGURAL**, **FIGURATE**, or **FIGURATIVE**, a term applied to whatever is expressed by obscure resemblances. The word is chiefly applied to the types and mysteries of the mosaic law; as also to any expression which is not taken in its primary and literal sense.

**FIGURAL**, or **FIGURATE NUMBERS**, are such as do or may represent some geometrical figure in relation to which they are always considered, as triangular numbers, pentagonal numbers, pyramidal numbers, &c.

**FIGURATIVE**, among grammarians, is

the same with what is otherwise called **characteristic**. See **CHARACTERISTIC**.

**FIGURATIVE COUNTERPOINT**, in music, is that wherein there is a mixture of discords along with the concords. See the article **COUNTERPOINT**.

The French call it **supposition**, because the transient discords suppose a concord immediately following. See the article **SUPPOSITION**.

**FIGURATIVE DESCANT**, in music. See the article **DESCANT**.

**FIGURE**, in physics, expresses the surface or terminating extremities of any body; and considered as a property of body affecting our senses, is defined a quality which may be perceived by two of the outward senses. Thus a table is known to be square by the sight, and by the touch. The schoolmen therefore dispute whether or no the quality of figure be the same with that of form. Boethius affirms, that figure ought to be predicated of inanimate bodies, and form of animate: others again extend form to all natural bodies, and figure to all artificial ones: in the opinion of others, form and figure are applied to all sorts of bodies, but not in all relations. If only the bare circumference or circumscription be considered, they call it figure; but if the circumference be considered as endowed with colour, then they call it form. See the article **FORM**.

**FIGURES**, in arithmetic, are certain characters whereby we denote any number which may be expressed by any combination of the nine digits, &c. See the article **DIGIT**.

**FIGURE**, in architecture, and sculpture signifies the representation of things made in solid matter, as statues, &c. Daviler observes, that those representations of human bodies sitting, as popes, or kneeling, as on monuments, or lying as river-gods, &c. are more properly called figures than statues.

**FIGURE**, in astrology, a description of the disposition of the heavens at a certain hour, in which the places of the planets and stars are marked in a figure of twelve triangles, called houses. See **HOUSE**.

**FIGURE**, in conic sections, according to Apollonius, is the rectangle made under the latus rectum and transversum in the hyperbola and ellipsis.

**FIGURE of the diameter**; the rectangle under any diameter, and its proper parameter is, in the ellipsis and hyperbola, called the figure of that diameter.

**FIGURE**,







**FIGURE**, among divines, is used for the mysteries represented under certain types. See the article **TYPE**.

**FIGURE**, in dancing, denotes the several steps which the dancer makes in order and cadence, considered as they mark certain figures on the floor.

**FIGURE**, in fortification, the plan of any fortified place, or the interior polygon, which, when the sides and angles are equal, is called a *regular*, and when unequal, an *irregular* figure.

**FIGURE**, in geometry, the superficies included between one or more lines, is denominated either rectilinear, curvilinear, or mixt, according as the extremities are bounded by right lines, curve lines, or both. See the articles **RECTILINEAR**, **CURVILINEAR**, &c.

**Equilateral FIGURE**. See **EQUILATERAL**. **Circumscribed FIGURE**. See **CIRCUMSCRIBED**.

**Inscribed FIGURE**. See **INSCRIBED**.

**Similar FIGURE**, &c. See **SIMILAR**, &c.

**FIGURE**, in the higher geometry, a term applied to three mechanical curves, called the figure of the secants, figure of the sines, figure of the tangents.

**FIGURE of the secants**, is generated thus. Let PQ (plate **XCVIII.** fig. 1. n<sup>o</sup> 1.) be a tangent to the circle QSO, and an infinite right line POR revolve about the center O, cutting the circle in S, and the tangent in P: then if upon the infinite base, or abscissal line AK (ibid. n<sup>o</sup> 2.) be taken the point A, and afterwards, the absciss A B be taken upon the same always equal to the circular arch QS, and the correspondent ordinate BC at right angles to it, be equal to the secant OP of that arch, and moves along AK; by this motion the extremity C of that ordinate will describe the curve EDC called the figure of the secants.

This curve consists of an infinite number of such parts, of which EDC is one; having an infinite number of parallel asymptotes FG, HI, LK, drawn at distances from one another, each equal to half the circumference of the circle QSO, which parts alternately fall below and above the abscissal line AK; the least ordinates being *qd*, or AD, each equal to the radius QO of the circle. The quadrature of the space ADCB will give the meridional parts for a given latitude in Mercator's chart. See the article **MERIDIONAL PARTS**.

**FIGURE of the sines**, is generated much after the same manner as the figure of the

secants, the difference being only that here every ordinate BC (ibid. n<sup>o</sup> 3.) answerable to the absciss AB, is the sine of the correspondent arch QS of the circle (see the former figure) instead of being its secant, as OP. This curve consists of an infinite number of parts, such as ACG, alternately rising above and falling below the abscissal line AI, which in reality make but one continued infinite serpentine line. Any space ABC of this curve is squarable. See farther in *Philos. Trans.* n<sup>o</sup> 337.

**FIGURE of the tangents**, is generated like the figure of the secants, with this difference, that the ordinate BC (ibid. n<sup>o</sup> 4.) is here equal to the tangent QP of the arch QS, to which the absciss AB is equal; the curve consisting of an infinite number of such parts, of which EAD is one, and having a like number of parallel asymptotes at equal distances from each other.

**FIGURE**, in grammar, a deviation from the natural rules of etymology, syntax and prosody, either for brevity, elegance or harmony.

Figure in etymology, or figure of words, is generally called *metaplasmus*. See the article **METAPLASMUS**.

Figures in syntax, or figures of sentences, are reduced to four kinds, *viz.* Ellipsis, pleonasmus, enallage, and hyperbaton; and the figures in prosody are these six, synalæpha, ecthliphis, synæresis, diæresis, systole and diastole. See each of these under its proper head.

**FIGURE**, in heraldry, a bearing in a shield representing a human face, as a sun, a wind, an angel, &c.

**FIGURE**, in logic, denotes a certain order and disposition of the middle term in any syllogism.

Figures are fourfold, 1. When the middle term is the subject of the major proposition, and the predicate of the minor, we have what is called the first figure. 2. When the middle term is the predicate of both the premises, the syllogism is said to be in the second figure. 3. If the middle term is the subject of the two premises, the syllogism is in the third figure; and lastly, by making it the predicate of the major, and subject of the minor, we obtain syllogisms in the fourth figure. Each of these figures has a determinate number of moods, including all the possible ways in which propositions differing in quantity or quality can be combined, according to any disposition of the middle term, in order

order to arrive at a just conclusion. See the article MOOD.

**FIGURE**, in painting and designing, denotes the lines and colours which form the representation of any animal, but more particularly, of a human personage. Thus a painting is said to be full of figures, when there are abundance of representations of men; and a landscape is said to be without figures, when there is nothing but trees, plants, mountains, &c.

**FIGURE**, in rhetoric, is a manner of speaking different from the ordinary and plain way, and more emphatical; expressing a passion, or containing a beauty.

Figures, therefore, are highly serviceable to clear difficult truths, to make a style pleasant and pathetic, and to awaken and fix attention. But as, in order to obtain these ends, they are to be used with prudence and caution, the following directions ought to be observed. 1. Let the discourse always be founded on nature and sense, supported with strong reason and proof, and then add the ornaments and heightenings of figures; for a man of clear understanding will despise the flourish of figures without sense, and pomp of words that wants truth and substance of things. 2. Be sparing in the use of figures. A passion described in a multitude of words, and carried on to a disproportionate length, fails of the end proposed, and tires instead of pleasing. 3. Figures must not be over adorned, nor affectedly laboured, and ranged into new and scrupulous periods; for by affectation and shew of art, the orator betrays and exposes himself, and it is apparent, that he is rather ambitious to set off his parts and wit, than to express his sincere concern and passion.

The principal and most moving figures are exclamation, doubting, correction, omission, apostrophe, suspension, prevention, concession, repetition, periphrasis, exaggeration, climax, comparison, prosopopœia, transition, sentence, epiphœnema, &c. See each of these under its proper head.

**FIGURED**, in general, something marked with figures. See the article FIGURE.

The term *figured* is chiefly applied to stuffs, whereon the figures of flowers, and the like, are either wrought, or stamped. See the articles STUFF, WEAVING, VELVET, &c.

**FIGURED STONES**, in natural history, those found in the shape of shells, or other parts of animals. See STONE.

**FILACER**, or **FILAZER**. See **FILAZER**.

**FILAGO**, the name by which Vaillant calls the gnaphalium, or cudweed. See the article GNAPHALIUM.

**FILAMENT**, in physiology and anatomy, denotes much the same as fibre. See the article FIBRE.

**FILAMENTS**, among botanists, is particularly used for the stamina. See the article STAMINA.

**FILANDERS**, in falconry, a disease in hawks, &c. consisting of filaments, or strings of blood, coagulated; and occasioned by a violent rupture of some vein, by which the blood, extravasating, hardens into these figures, and incommodes the reins, hips, &c.

**FILANDERS** are also worms as small as thread, and about an inch long, that lie wrapt up in a thin skin, or net, near the reins of an hawk, apart from either gut or gorge.

This malady is known by the hawk's poverty; by ruffling her tail; by her straining the fist, or perch, with her pounces; and lastly, by croaking in the night, when the filanders prick her. The disease proceeds from bad food, and must be remedied in time, to prevent its spreading over the whole body, and destroying the bird. These mult not be killed as other worms are, for fear of imposthumes from their corruption, being incapable of passing away with the hawk's meat. They must only be stupified, to prevent their being offensive; and this is done by giving the hawk a clove of garlic, after which, she will feel nothing of the filanders for forty days. It will be prudent in the falconer when he observes the hawk poor and low, to give her a clove of garlic once a month by way of prevention.

**FILAZER**, or **FILACER**, an officer of the Common-Pleas, so called from his filing those writs whereon he makes out process.

There are fourteen of these officers, who are severally allotted to particular divisions and counties, and make out all writs and processes upon original writs, issuing out of the court of Chancery, and returnable in that court. They likewise make out all appearances and special bails, upon any process issued by them, and make the first fieri facias

on special bails, writs of habeas corpus, superiædeas upon special bail ; also writs of view in real actions, &c.

**FILBERT**, or **FILBERD**, the fruit of the corylus, or hazel. See **CORYLUS**.

This is the least sort of small nuts, and more nourishing than the common nuts ; but it is hard to digest. They are however worthy of being propagated in orchards and gardens ; which is done by sowing them in February.

In order to preserve them good, they should be kept in sand, in a moist cellar, where the vermin cannot come at them to destroy them : the external air should not be kept from them, for this would occasion their turning mouldy.

**FILE**, among mechanics, a tool used in metal, &c. in order to smooth, polish, or cut.

This instrument is of iron, or forged steel, cut in little furrows, with chissels, and a mallet, this and that way, and of this or that depth, according to the grain or touch required. After cutting the file, it must be tempered with a composition of chimney soot, very hard and dry, diluted, and wrought up with urine, vinegar, and salt ; the whole being reduced to the consistence of mustard. Tempering the files consists in rubbing them over with this composition, and covering them in loam ; after which they are put in a charcoal fire, and taken out by that time they have acquired a cherry colour, which is known by a small rod of the same steel put in along with them. Being taken out of the fire, they are thrown into cold spring water, and when cold, they are cleaned with charcoal and a rag ; and being clean and dry, are kept from rust by laying them up in wheat bran. Iron files require more heating than steel ones. Files are of different forms, sizes, cuts and degrees of fineness, according to the different uses and occasions for which they are made. Those in common use are the square, flat, three square, half round, round, thin file, &c. each of which may be of different sizes, as well as different cuts.

The rough or coarse toothed files are to take off the unevenness of the work which the hammer made in the forging ; and the fine toothed files are to take out of the work the deep cuts or file-strokes of the rough files : the files succeed one another in this order, first

the rubber, then the bastard toothed file, next the fine toothed file, and lastly, the smooth file. Thus the files of different cuts succeed one another, till the work is so smooth, as it can be filed. After which, it may be made still smoother, by emery, tripoli, &c. See **POLISHING**. In using all sorts of files, the rule is to lean heavy on the file in thrusting it forward, because the teeth of the files are made to cut forward ; but in drawing the file back again for a second stroke, it is to be lightly lifted, just above the work, by reason it does not cut in coming back.

The file is used in pharmacy to reduce hard substances to fine particles, whose consistence will not admit of powdering.

**FILES**, the gros, containing twelve dozen, pay on importation 7s. 8,  $\frac{4}{10}$ d. and on exportation draw back 6s. 9d. Moreover, for every 112 lb. of the iron, the duty is 4s. 8,  $\frac{2}{10}$ d. and on exportation the draw-back is 4s. 8,  $\frac{2}{10}$ d.

**FILE**, or **LABEL**, in heraldry. See **LABEL**.

**FILE**, in the art of war, a row of soldiers, standing one behind another, which is the depth of the battalion, or squadron. The files of a battalion of foot are generally three deep ; as are sometimes those of a squadron of horse. The files must be straight, and parallel one to another.

*To double the FILES*, is to put two files into one, which make the depth of the battalion double of what it was in number of men.

*The FILE leaders*, are the foremost men in each file ; the bringers up are the last men of each file, or the last rank of the battalion.

*To FILE OFF*, is the same as to defile, or to file off from a large front to march in length. See the article **DEFILE**.

**FILICULA**, the DWARF-FERN. See the article **FILIX**.

**FILIGRANE**, or **FILIGREE-WORK**, any piece of gold or silver-work, that is curiously done, with grains or drops on the filaments or threads.

**FILING**, in smithery, the operation of fashioning metalline bodies by means of a file. See the article **FILE**.

**FILIPENDULA**, **DROPWORT**, a genus of the *icofandria-pentagynia* class of plants, the corolla of which consists of five, or more, oblong, obtuse, plane, patent petals, inserted into the calyx : there is no pericarpium, except the crusts of the

the feed ; the receptacle is globose : the seeds are oblong, acuminate, and disposed in a circular manner.

This plant is a diuretic : it is recommended against colics, flatulencies, and the fluor albus : but its chief use consists in stopping too great a flow of the lochia.

**FILIX**, in botany, an order of the *cryptogamia* class of plants, comprehending the fern, horse-tail, adder's tongue, maiden-hair, spleenwort, polypody, &c. See the articles **FERN**, **HORSE-TAIL**, &c.

**FILLET**, in anatomy, the same with **froenum**. See the article **FROENUM**.

**FILLET**, or **FILET**, in architecture, a little square member, ornament, or moulding, used in divers places, and upon divers occasions, but generally as a crowning over a greater moulding.

**FILLET**, in heraldry, a kind of orle or bordure, containing only a third or fourth part of the breadth of the common bordure. It is supposed to be withdrawn inwards, and is of a different colour from the field. It runs quite round, near the edge, as a lace over a cloak. It is also used for an ordinary drawn like a bar, from the sinister point of the chief, across the shield, in manner of a scarf ; though it sometimes is also seen in the situation of a bend, fesse, cross, &c.

According to Guillim, the fillet is a fourth part of the chief, and is placed in the chief point of the escutcheon.

**FILLET**, in painting, gilding, &c. is a little rule or reglet of leaf-gold, drawn over some mouldings, or on the edges of frames, pannels, &c. especially when painted white, by way of enrichment.

**FILLET**, in the manege, the loins of an horse, which begin at the place where the hinder part of the saddle rests.

**FILLER-HORSE**, one yoked immediately to a cart. See the article **CART**.

**FILLY**, a term among horse-dealers, to denote the female or mare-colt. See the article **FOAL**.

**FILM**, a thin skin or pellicle. In plants, it is used for that thin, woody skin, which separates the seeds in the pods, and keeps them apart.

*White FILM upon the eye of a horse*, may be removed by lifting up the eyelid, after the eye has been washed with wine, and stroaking it gently, with one's thumb, with wheat flower ; also common salt, or salt of lead, beaten fine, and put into the eye, is proper to consume a film : or you may wash the horse's eye with your spittle

in the morning, fasting, having first put a little salt into your mouth : but there is nothing so effectual as sal armoniac, beaten and put into the eye, and repeated every day till the film is gone.

**FILTER**, or **FILTRE**, in chemistry, a strainer commonly made of bibulous or filtering paper in the form of a funnel, through which any fluid is passed, in order to separate the gross particles from it, and render it limpid. See the article **CLARIFICATION**.

There are several filters made of flannel and linnen-cloth.

**FILTRATION**, in chemistry, a species of clarification. See **CLARIFICATION**.

**FIMBRIÆ**, denotes appendages disposed by way of fringe round the border of any thing : such are those about the thicker extremities of the fallopian tubes. See the article **FALLOPIAN**.

**FIMBRIATED**, in heraldry, an ordinary with a narrow bordure or hem of another tincture.

This, in latin, is called *fimbriatus*, that is, edged or fringed.

**FIN**, *pinna*, in natural history, a well known part of fishes, consisting of a membrane supported by rays, or little bony or cartilaginous officles.

The number, situation, and figure of fins, are different in different fishes. As to number, they are found from one to ten, or more ; with respect to situation, they stand either on the back only, the belly only, or on both ; and as to figure, they are either of a triangular, roundish, or oblong square form. Add to this, that in some they are very small ; whereas, in others, they almost equal the whole body in length.

For the use of the fins in swimming. See the article **SWIMMING**.

*Whale-FINS*. See the article **WHALE**.

**FINAL**, in general, whatever terminates or concludes a thing.

**FINAL CAUSE**. See the article **CAUSE**.

**FINAL LETTERS**, among hebrew grammarians, five letters so called, because they have a different figure at the end of words from what they have in any other situation. These are caph, mem, nun, phe, tzade, all comprehending in the word *camnephatz* ; which, at the end of words, are written thus, פתצמנכ ; whereas, in any other situation, their form is this, פתצמנכ, on which account they are likewise called biform.

**FINAL**, in geography, a port-town of Italy, subject

subject to Genoa, and situated on the Mediterranean, about thirty-seven miles south-west of that city.

**FINANCES**, in the french polity, signify the revenues of the king and state.

**FINCH-KIND**, in ornithology, an appellation given to a genus of birds, known among authors by the name of *fringilla*, See the article **FRINGILLA**.

**FINE**, in law, has divers significations, it being sometimes taken for a sum of money advanced and paid for the income of lands. It is likewise used in another sense, where a sum is paid as an amends, or by way of punishment for an offence committed. See **MULET**.

Fine denotes also a covenant made before justices, and entered upon record, for conveyance of lands and other inheritable things, in order to cut off all controversies. As this fine is a concord acknowledged before a competent judge concerning lands, tenements, and other immoveable things, and for its better credit, is supposed to be made in the presence of the king, as it is levied in his court; it therefore binds women covert, who are parties, and others whom the law generally disables to act; for this reason, because all presumption of deceit is excluded, where the king and his court of justice are deemed privy to the matter transacted. Fines, on account of their solemnity, are acknowledged in the court of common pleas. Justices of assize may also take them, though they seldom do it without a special *dedimus potestatem*, by virtue of which writ, fines may be also taken by commissioners in the country, and the *dedimus* surmises that parties are not able to travel to Westminster; for by the common law, all fines are levied in court.

In every fine there are five parts, 1. An original writ, generally termed a writ of covenant. 2. The *licentia concordandi*, or the king's licence, for which a fine, called the king's silver, is paid. 3. The concord, which contains the agreement between the parties in what manner the land shall pass, and is the foundation and substance of the fine. 4. The note of the fine, or abstract of the original contract. 5. The foot of the fine containing the day, year, and place, and before what justices the contract was made.

There are four sorts of fines. 1. A *fine sur cognizance de droit comme ceo*, &c. which is the principal and surest kind of fine, as it gives possession, at least in law,

to the cognizee, without any writ of execution. 2. A *fine sur done, grant & render*, or double fine, whereby the cognizee, after a release and warrant to him by the cognizor, grants and renders back the lands, &c. or some rent, many times limiting remainders. 3. A *fine sur cognizance de droit tantum*, and this is a fine executory, that is commonly used to pass a reversion, and sometimes by tenant for life to release to the person in reversion. 4. A *fine sur concessit*, which is made use of to grant away estates for life or years, and it is also executory; so that the cognizee must enter or have a writ of *habere facias possessionem*, to obtain possession.

Fines are either with proclamation, called fines according to the statutes, or without proclamation, called fines at common law. The statutes ordain, that every fine shall be openly read and proclaimed in the common pleas, and a transcript of it sent to the justices of the assize, and another to the justices of the peace of the county where the land lies, in order to be proclaimed there; and when this is certified, privies in blood, as the heirs of the cognizor, are presently barred, but strangers to the fine have five years allowed them to enter and claim their right. The like time is given to infants, after they come to full age; to feme-coverts, not joining in fines after the death of their husbands; to prisoners, after they are set at liberty; and to persons out of the realm, after their return.

**FINE ADNULLANDO LEVATO DE TENEMENTO QUOD FUIT DE ANTIQVO DOMINICO**, is a writ directed to the common pleas to disannul a fine levied of lands in ancient demesne, to the prejudice of the lord.

**FINE for alienation**, was a fine paid to the king by his tenants in chief, for a licence to alien their lands. These fines are taken away by 12 Car. II. cap. 24.

**FINE CAPIENDO PRO TERRIS**, is a writ that lies where a person upon conviction of an offence by jury, having his lands and goods taken into the king's hands, and his body committed to prison, obtains the favour to be remitted his imprisonment, and his lands and goods to be restored to him for a sum of money.

**FINE FORCE**, is an expression in the statute 35 Henry VIII. c. 12. denoting that a person is forced to do that which he can no way avoid.

**FINE NON CAPIENDO PRO PULCHRE PLACITANDO**, is a writ to hinder officers

of courts from taking fines for fair pleading.

**FINE PRO REDISSEISINA CAPIENDA**, is a writ which lies for the release of a person imprisoned for a redisseisin, upon paying a reasonable fine.

**FINES for writs**, are paid in divers cases for original writs. Thus for every writ of plea of land, if it be not of right patent, which is for the yearly value of five marks; and all original writs in debt and trespass, where the debt or damage is 40 l. a fine is due to the king of 6 s. 8 d. and more proportionably when any writ is forthings of greater value.

**FINERS of gold and silver**, are those who separate these metals from coarser ores. See the article **REFINERS**.

**FINERY**, in the iron-works, one of the forges at which the iron is hammered and fashioned into what they call a bloom, or square bar. See the article **IRON**.

**FINGERS**, *digiti*, in anatomy, the extreme part of the hand divided into five members. See the article **HAND**.

The names of the fingers, reckoning from the thumb, are, 1. Pollex. 2. Index. 3. Medius. 4. Annularis. 5. Auricularis. In each of these there are three bones, which make three phalanges, the upper of which are much larger than the lower. Their exterior surface is gibbous or convex, and their interior is plane, but somewhat hollowed, for the convenience of seizing and laying hold of things. The first phalanx, in the part where they are articulated with the bones of the metacarpus at their heads, have a glenoid cavity, by means of which articulation, they have a free motion every way. In the other extremity, there are two heads with two cavities joined to the second phalanx, where the motions of flexion and extension are all that are possible; and the same is the case between the second phalanx and the third. In the upper extremities of the bones of the second and third phalanx, there is to be observed an eminence placed between two cavities: this has the same use with the olecranon. The farthest extremity of the last phalanx, has a point or apex somewhat broader than the body. See the articles **PHALANX** and **THUMB**.

The muscles of the fingers are in part common and in part proper. The common are the flexors of the first, second, and third phalanx, the extensor and interossei. See the articles **EXTENSOR** and **INTEROSSEI**.

Of the proper muscles of the fingers, those belonging to the thumb are five, *viz.* flexor, extensor, thenar, hypothenar, and antithenar. The proper muscles of the index and auricularis, are two in each, *viz.* an extensor and an abductor. See the articles **FLEXOR**, **EXTENSOR**, **THENAR**, &c.

**FINING**, or **REFINING**. See the articles **CLARIFICATION** and **REFINING**.

**FINING of wines**. See the article **WINE**.

**FINISHING**, in architecture, is frequently used for a crowning, acroter, &c. raised over a piece of building, to terminate, complete, or finish it. See the article **CROWNING**.

**FINISTERRA**, the most westerly cape or promontory of Spain, in 10° 15' west long. and 43° north lat.

This cape is likewise the most westerly part of the continent of Europe.

**FINITE**, something bounded or limited, in contradistinction to infinite. See the article **INFINITE**.

The schools distinguish finite into two kinds, *viz.* finite in perfection, and finite in extension. See **PERFECTION** and **EXTENSION**.

Finite in perfection, is applied to things which have not all possible perfection, but such only as may be comprehended by the mind. Thus the world, though supposed by the Cartesians infinite in point of extension, is yet finite in essence or perfection. In order to arrive at an idea of a thing finite in perfection, we must first conceive the thing as having certain perfections, and then conceive some other perfections which it has not; or some perfections in a greater degree. Thus when I say, that there is a finite number, I first conceive a number consisting of three units, then conceive other units beyond these three. I conceive my mind to be finite, by observing certain perfections beyond those I find in my mind.

Finite in extension, is applied to things which have not all possible or conceivable extension. To arrive at an idea of a thing finite in extension, we must first conceive the thing as having a certain extension, and then conceive some other extension which it has not; thus I conceive a room to be finite in extension, by having an idea of extension beyond what is contained therein.

**FINITO**, in music; a canon or fugue is said to be finito, when it is not perpetual, but when, at some certain place, all the parts join or unite, after having

ing followed one another for some time.

**FINITOR**, in astronomy, the same with horizon, so called because it terminates the sight or prospect. See **HORIZON**.

**FINLAND**, a province of Sweden, lying northward of the gulph of Finland, and eastward of the bothnic gulph. It is a frontier province, bounded by Russia on the east.

**FINNIKIN**, the english name of a species of pigeon, remarkable for its wheeling round several times, whenever it courts the female.

**FINNOCHIA**, **SWEET-FENNEL**, in botany, a species of fennel, cultivated in gardens as a sallad-herb, and as such much liked by some.

**FINSKALE**, a name used in some parts of the kingdom for a fish more usually called rudd. See the article **RUD**.

**FINTO**, in music, a feint, or an attempt to do something and not to do it; as cadenza finto is, when having done every thing proper for a true cadence, instead of falling on the right final, another note, either higher or lower, is taken, or perhaps a pause brought in. See the articles **INGANNO** and **SFUGGITA**.

**FIR-TREE**, *abies*, in botany. See the article **ABIES**.

*Scotch FIR*, a name given to the mountain-pine. See the article **PINE**.

**FIRE**, *ignis*, in physiology, according to Boerhaave, is something unknown, which has the property of penetrating all solid and fluid bodies, and dilating them so as to take up more space.

The most universal and sensible character of fire, and that which best distinguishes it from every other thing, is its giving heat: whence fire may be generally defined, to be whatever warms or heats bodies. However, by the general name of fire, men seem to understand a sensation or complex notion of light, heat, burning, melting, &c.

*Nature of FIRE*. The doctrine of fire, as laid down by modern philosophers, is very different. The great and fundamental difference in respect to the nature of fire is, whether it be originally such, formed thus by the creator himself at the beginning of things, or whether it be mechanically producible from other bodies, by inducing some alterations in the particles thereof. The former opinion is maintained by Homberg, Boerhaave, the younger Lemery, and s'Gravesande; the latter is chiefly supported by the

english philosophers, lord Bacon, Mr. Boyle, and Sir Isaac Newton.

Bacon, in his treatise *De Forma Calidi*, deduces, from a great number of particulars, that heat in bodies is no other than motion; only a motion so and so circumstantiated: so that to produce heat in a body, nothing is required but to excite a certain motion in the parts thereof.

Boyle seconds him in an express treatise of the mechanical origin of heat and cold, and maintains the same doctrine with new observations and experiments; as a specimen whereof, we shall here give the two following.

1. In the production, says he, of heat, there appears nothing on the part either of the agent or patient, but motion and its natural effects. When a smith briskly hammers a small piece of iron, the metal thereby becomes exceedingly hot; yet there is nothing to make it so, except the forcible motion of the hammer impressing a vehement and variously determined agitation on the small parts of the iron, which, being a cold body before, grows, by that super-induced commotion of its small parts, hot: first, in a more loose acceptation of the word, with regard to some other bodies, compared with which it was cold before: then, sensibly hot; because this agitation surpasses that of the points of our fingers; and in this instance oftentimes the hammer and anvil continue cold, after the operation: which shews that the heat acquired by the iron, was not communicated by either of those implements, as heat; but produced in it by a motion, great enough strongly to agitate the parts of so small a body as the piece of iron, without being able to have the like effect upon so much greater masses of metal as the hammer and the anvil. Though if the percussions were often and briskly renewed, and the hammer were small, this also might be heated; whence it is not necessary, that a body itself be hot to give heat.

2. If a large nail be driven by a hammer into a plank of wood, it will receive several strokes on its head, before it grow hot: but when it is once driven to the head, a few strokes suffice to give it a considerable heat; for while, at every blow of the hammer, the nail enters further into the wood, the motion produced is chiefly progressive, and is of the whole nail tending one way; but when that motion ceases, the impulse given by the

stroke being unable to drive the nail further on, or break it, must be spent in making a various, vehement, and intestine commotion of the parts among themselves, wherein the nature of heat consists.

Agreeable to this is the opinion of Sir Isaac Newton, who conceives that gross bodies may be converted into light, by the agitation of their particles; and light, again, into gross bodies, by being fixed therein.

On the other hand, M. Homberg, in his *Essai du Souffre Principe*, holds, that the chemical principle, or element sulphur, which is supposed one of the simple, primary, pre-existent ingredients of all natural bodies, is real fire, and consequently that fire is coeval with bodies.

Dr. s'Gravesande goes on much the same principle: fire, according to him, enters the composition of all bodies, is contained in all bodies, and may be separated or procured from all bodies, by rubbing them against each other; and thus putting their fire in motion: but fire, he adds, is by no means generated by such motion.

Mr. Lemery, the younger, agrees with these two authors in asserting this absolute and ingenerable nature of fire: but he extends it farther. Not contented to confine it as an element to bodies, he endeavours to shew, that it is equally diffused through all space, and that it is present in all places; in the void spaces between bodies, as well as in the insensible interstices between their parts.

This last sentiment falls in with that of Boerhaave, and the celebrated M. Musschenbroek. But, notwithstanding it is evident that fire, heat, flame, &c. are only the different modifications of the particles of light, and that the particles of light themselves depend entirely on velocity for their lucid quality; since, by many experiments, we know, that the particles of bodies become lucid, or particles of light, by only producing in them a requisite degree of velocity: thus the particles in a rod of iron, being hammered very nimbly, shine and become red hot: thus, also, the violent stroke of the flint against the steel, in striking fire, puts the particles of the steel, which it takes off, into such a motion, as causes them to melt and become red hot, which makes the sparks of fire produced by each stroke. As, therefore, fire consists in the great velocity of the particles, so

it may be communicated from one body in which it is, to another in which it is not, after the same manner that one body in motion will communicate motion to another that has got none.

Fire differs from heat only in this, that heat is a motion in the particles of a body, with a lesser degree of velocity; and fire a motion with a greater degree of velocity, viz. such as is sufficient to make the particles shine; though we often call such a state as will burn, fire, though it does not actually shine; and we seldom call those lucid bodies fires, which only shine, and do not burn. These are a sort of phosphori, which, though they have no heat, yet seem to owe their lucidity to the motion of their parts. See the articles HEAT and PHOSPHORUS.

There seems to be no other difference between fire and flame, than this; that fire consists in a glowing degree of velocity in the parts of a body, while yet subsisting together in the mass; but flame is the same degree of velocity in the particles dissipated and flying off in vapour: or, to use Sir Isaac Newton's expression, flame is nothing else but a red hot vapour.

See the article FLAME.

*General division of FIRE.* Fire, in general, is divided into three kinds or species, viz. celestial, subterraneous, and culinary.

By celestial fire we principally mean that of the sun, without regard to the fire of the fixed stars, though this, perhaps, may be of the same nature. By subterraneous fire, we understand that which manifests itself in fiery eruptions of the earth, volcanoes, or burning mountains; and by any other effects it produces in mines, or the more central parts of the earth. By culinary fire, we mean that commonly employed in all chemical operations in the animal, vegetable, atmospheric, marine, and mineral kingdoms. Considered in itself, fire seems to exist in greatest purity and perfection in the celestial regions; at least we are insensible of any considerable smoke it yields; for the rays of light come to us from the sun unmixed with any of that gross, feculent, or terrestrial matter found in culinary and subterraneous fires. And allowing for this difference, the effects of the solar fire appear the same as those of the culinary fire. To examine also the effects of subterraneous fires, we shall find them the same with those produced by the culinary fire. And thus all the three kinds of  
fires



fires agree in giving the motion of rarefaction to bodies. All subterraneous and culinary fires require some pabulum or fuel, wherein it resides, or is collected ; but whether the same is required for the subsistence of the celestial fire, is more than we know. See the article FUEL.

Sir Isaac Newton is of opinion, that the fire of the sun and fixed stars, is conserved by the greatness of these bodies, and the mutual action and re-action between them and the light which they emit ; that their parts are kept from fuming away, not only by their fixity, but by the vast weight and density of the atmospheres incumbent upon them, and very strongly compressing them, and condensing the vapours and exhalations which arise from them.

*Effects and properties of FIRE.* So great is the power, so extensive the action, and so wonderful the manner wherein fire acts, that it was antiently held and adored as the supreme god, by a notion reputed the wisest of all others. Thus some of the chemists, having found its extraordinary force, took it for an uncreated being ; and many of the most eminent among them, attributing all the knowledge they had acquired to this instrument, called themselves philosophers of fire, as thinking they could not be dignified by a higher title.

Fire, in effect, is the universal instrument of all the motion and action in the universe : without fire, all bodies would become immoveable ; whence fire is the universal cause of all motion or change. The effects of fire in burning, consists in this, that the velocity of the particles of fire so far increases the velocity of the parts of the body to which it is applied, as to cause a separation beyond the sphere of corpuscular attraction ; by which means the body will be dissolved, and the particles, which are volatile, will fly off in the form of steam, smoke, fume, &c. while that which remains appears in the form of coal, calx, ashes, caput mortuum, &c.

The parts of some bodies are extremely volatile, and will most of them be dissipated by the action of fire : but others, again, are to be found whose parts are of such a nature, or so fixed, as not to yield to the force of fire, or the velocity communicated to them will not be able to dissolve the corpuscular attraction ; but when this glowing velocity of the parts is abated, or, in other words,

when the fire in the body is extinct, the parts, and, of course, the whole body, appear unaltered ; of which sort of substance we have a notable instance in those fossils called the asbestus and amianthus. See ASBESTUS and AMIANTHUS.

All the physical knowledge we can have of a subject, must arise from attending to its properties and effects : but these properties and effects can never be discovered without the help of experiments, which in physical enquiries are the only interpreters betwixt the senses and the reason : whence all those notions of fire should be taken as precarious, that are taken from the testimony of the senses, or the naked reason unassisted by experiments.

We frequently find the effects of fire produced where no visible fire appeared. Thus the fingers are easily burnt by an iron heated below the degree of ignition, or so as to be no way visibly red ; whence we find, that the eye is no judge of fire : so likewise the touch gives us no positive notice of any degree of fire below the natural heat of the body, or any so great as to destroy the organ. Again, the effects of fire are often produced without any manifest signs of burning, melting, &c. as in evaporations, exiccations, &c. If this method of exclusion and rejection were pursued to its due length, we should find perhaps no criterion, infallible mark, or characteristic of fire in general, but that of a particular motion struggling among the small parts of bodies, and tending to throw them off at the surface. And if this should prove the case, then such a motion will be the form or essence of fire ; and which being present, makes fire also present ; and when absent, makes fire also absent ; whence to produce fire and produce this motion in bodies, will be the self-same thing.

But from repeated experiments we learn, 1. That, in general, both solids and fluids manifest an expansive motion upon being heated. 2. That the direct inflammable matter of fuel, is oil, or an unctuous substance. 3. That no fuel will burn or consume, without the admission of fresh air. 4. That the air which has once passed through burning fuel, is, of itself, unfit to animate fire again. And, 5. That flame exists only on the surface of fuel.

It appears a property belonging to fire, that its parts endeavour equally to diffuse themselves ; that is, by moving every way,

way, and consequently tend neither more nor less to one point than another. If fire be collected in any body so as to be perceivable by our senses, it removes itself out of the same by its own power, and expands every way from the center of its space or body; whence we learn the proper conatus of fire, and that the recession of it is spontaneous. From this last property of fire, may be computed its force and quantity: for the state of fire, as defined above, may be called its stagnation; and the powers of stagnating fires will then be as the spaces wherein it is contained; consequently the communication of powers will be to each other as the spaces.

It were to be wished that the proportional quantity of fire contained in a body, could be determined; but this is not so easy as at first sight it may seem, by reason, that though from the discovered effects of fire we may estimate its power, we cannot estimate its quantity; as the augmentation of the fire, arising from the nearness of its particles, is hitherto undetermined: for so long as the proportion of the power of fire depending on its density or closeness, to that depending on the quantity thereof is unknown, so long we shall be unable to argue from the effect of fire to the quantity thereof.

Yet fire, whilst it thus remains in a heated body, says Boerhaave, does not seem to unite with it into one corporeal concrete mass; since, though greater than before, it is not found heavier. Neither does fire diminish any thing of the weight which the body would have had at that time, and to which cold should restore it. Nothing of this kind appears from any experiment yet made.

It may be observed, that the same fire as applied in different quantities, first compounds bodies; and when raised to a higher pitch, decomposes them again. One and the same fire applied to the same body, with different circumstances, will have quite different effects, and especially as the air happens to be variously admitted during the operation; and the same fire, as applied in different degrees to the same object, has very different effects, as is found by experiments.

Fire and flame are abolished or extinguished by suffocation, or an action contrary to ventilation, as being destructive or preventive of that internal commotion and discharge of the oily particles of fuel, by means of the free air, where-

in the nature of open and consuming fire consists. And hence fire and flame are quenched by water, or even by spirit of wine, or oil of turpentine, if a live coal or lighted candle be suddenly plunged therein below the surface of the liquor. For the degree of heat which water, spirit of wine, or oil of turpentine unfired, are capable of receiving, is much less than that of a burning coal or candle: whence the greater heat is subdued by the less, as fire quenched by boiling water.

**FIRE**, in chemistry, the great instrument by which most of the operations in that art are performed.

The kind, degree, direction, &c. of fire, are things the chemist is principally to attend to. There are, in chemistry, as many kinds of fire, as there are mediums through which it may be conveyed, or fuels that afford it. For common use, fire is conveyed through ashes, sand, water, &c. or directly through the containing vessel. Hence, fires are denominated of various kinds, as those of sand, filings of iron, and ashes, the reverberatory fire, the *ignis rotæ*, or fire for fusion, the lamp fire, the *balneum mariæ*, the vapour bath, and the fire of suppression. The chemists use also several other kinds of heats, which may be classed among the fires, such as insolation, a bath of horse-dung, a bath of the skins of grapes, and the heat of quick-lime.

For the *balneum arenosum*, or the fires or baths of sand, filings of iron, and ashes, *balneum mariæ*, *balneum vaporis*, or vapour-bath, see **BALNEUM**.

The reverberatory fire is made in a furnace covered with a dome, that by this means the heat or flame, which has always a tendency to make its escape at the superior parts of the furnace, may be reverberated, or beat back on the vessel immediately exposed to it. To expose a vessel to a naked fire, or to distil with a naked fire, is when there is no intermediate substance between the distilling vessel and the fire.

The *ignis rotæ*, or fire for fusion, is when a crucible or any other vessel containing the matter destined for fusion, is surrounded with live-coals.

Lamp-fire, is when any matter contained in a glass-vessel is rendered hot by the equable heat of a lighted lamp.

Fire of suppression, is when, in order to distil per descensum, the fire is laid above the matter, so that the moisture forced from it, by means of the heat, is precipitated

pitated to the bottom of the vessel : or when the body of the retort, or other vessel, is covered over with fire.

Insolation, is when any matter designed either to be put into fermentation or dried, is exposed to the heat of the sun.

The bath of horse-dung, called also the horse's belly, is when a vessel containing any matter to be either digested or distilled, is placed in a large heap of horse-dung.

Bath of the skins of grapes, like the bath of horse's dung, serves for digestions or distillations ; the skins are to be collected after the vintage.

The heat of quick-lime moistened, may serve for some distillations.

Some differences may be found in the effects produced by these different fires, applied in the same degree. But they have not, perhaps, been noted as they deserve. In several bodies, it is evident that dry and moist heats have different effects, which we may find remarkably in the common culinary operations of boiling, roasting, baking, &c. And hence, when the same effects are required perfectly similar, the same kinds as well as degrees of fire are to be used.

The purest fire is that of alcohol, or perfectly pure spirit of wine ; the next in purity is that of distilled oils ; the next, that of charcoal, or charred turf ; and the impurest, pit-coal : but all these have nearly the same effect, when received through the same kind of medium.

*Degrees of FIRE.* The last thing to be considered is, how to regulate and ascertain the degrees of fire in chemical operations, so as to produce the effects required in every case. The common directions of chemists about this matter are full of uncertainty ; the first, second, third, and fourth degrees of heat, or fire, meaning no precise degrees, measured by any standard : however, according to Boerhaave, they are as follows.

The first degree of fire is that by which nature performs the office of vegetation in plants, and whereby chemistry imitates or does the like : this commences from the highest degree of cold, which, in Fahrenheit's thermometer, is denoted by one, and ends at 80 degrees : since in this whole interval we find certain plants give indications of life and growth.

This heat is suited to extracting of the native spirits of odoriferous vegetables with oils, as that of roses, jessamin, &c. and again, to making the more curious insolutions, &c.

The second degree of fire may be accounted that of the human body, in a healthy state. This degree is always greater than that of the ambient air, and may be supposed to commence at the 40th degree of the thermometer, and end about the 94th. Within this compass animals may live and subsist, that is, if their juices be of any degree of heat within these bounds. This degree is adapted to vinous and acetous fermentation, putrefaction, exclusion of the chick, the finer digestions, the making of tinctures and elixirs ; and the adepts have used it for the first digestion of their mercury, by carrying the including vessel constantly in their pocket. The third degree of fire is that which extends from 94 degrees of the thermometer to 212, at which last water usually boils. This degree is required in the distillation of simple and compound waters, the essential oils of vegetables, and will coagulate or consolidate the serum, blood, and other animal juices, and consequently destroy the creatures.

The fourth degree may be taken from 212 to 600 of the thermometer, within which latitude quicksilver or oil of vitriol boils, distils, or becomes volatile. This degree is suited to the melting of lead, tin, bismuth, &c. and the subliming of sal armoniac and sulphur, the calcining of antimony, &c.

The fifth degree is that wherein the other metals melt, and which commences from 600 degrees of the thermometer, and ends where iron is held in a state of fusion. In this degree most bodies are destroyed ; but glass, gold, silver, copper, and iron remain long unchanged ; all other fixed bodies grow red-hot in this degree, and all the unvitrifiable stones are calcined.

The sixth and highest degree of fire, hitherto known, is that of the burning lens or concave, by M. Villette, Tschirnhausen, Buffon, and others. The focus of these lenses will even volatilize what is called the metalline or mercurial part of gold, and vitrify the more terrestrial. See the article *BURNING-GLASS*.

The fires of sand, filings of iron, and ashes, have generally their degrees from the first to the third : the reverberatory fire has its degrees from the first to the fourth : the *ignis notæ* serves for calcinations and fusions ; and a vessel may receive different degrees of heat from a lighted lamp : the *bañeum mariæ* and *bañeum vaporis* have also their degrees, as has the fire of suppression its degrees :

*Insolation.*

Insolation has its degrees in proportion to the heat of the sun, to which the substances are exposed: the bath of horse's dung has its degrees, according to the bulk of the heap, or the place in which it is lodged: the bath of grape-skins has also its degrees, like that of the bath of horse's dung: and the heat of quick-lime has also its degrees; for according as we desire it more or less strong, we expose it in powder longer or shorter to the open air; and when we have occasion for all its heat, we use it as quick as we possibly can.

**FIRE**, in medicine. See **CAUSTICS**.

**FIRE**, in surgery. See **CAUTERY**.

*St. Anthony's FIRE*, in medicine. See the article **ERYSIPELAS**.

*Walking FIRE*, in meteorology. See the article **WILL-WITH-A-WHISP**.

**FIRE**, in theology. See the articles **HELL**, **CONFLAGRATION**, &c.

We read of the sacred fire in the first temple of Jerusalem, concerning which the Jews have a tradition that it came down from heaven: it was kept with the utmost care, and it was forbidden to carry any strange fire into the temple. This fire is one of the five things which the Jews confess were wanting in the second temple.

The pagans had their sacred fires, which they kept in their temples with the most religious care; and which were never to be extinguished. Numa was the first who built a temple to fire, as a goddess, at Rome, and instituted an order of priestesses for the preservation of it. See the article **VESTALS**.

Fire was the supreme god of the Chaldeans; the magi were worshippers of fire; and the Greeks and Armenians still keep up a ceremony called the Holy Fire, upon a persuasion that every easter-day a miraculous fire descends from heaven into the holy sepulchre, and kindles all the lamps and candles there. On this occasion the church of the holy sepulchre is crowded by a numerous and distracted mob, who make a solemn procession with standards, crucifixes, &c. after which the people light their candles at the sacred flame, and immediately apply it to their beards, faces, and bosoms, pretending that it will not burn like an earthly flame: they also think that if they are buried in a shroud smutted with this celestial fire, it will secure them from the flames of hell.

**FIRE**, in the art of war, a word of com-

mand to the soldiers, to discharge their muskets; to the cavalry, to discharge their carbines or pistols; to the grenadiers, to fire their grenades; and to the gunners, to fire the guns.

*Running FIRE* is when a rank of men, drawn up, fire one after another: or, when the lines of an army are drawn out to fire on account of a victory, each squadron or battallion takes it from another, from the right of the first line to the left, and from the left to the right of the second line.

**FIRE-ARMS** are all sorts of arms charged with powder and ball, as cannon, muskets, carbines, pistols, blunderbusses, &c. See the articles **CANNON**, **GUN**, &c.

**FIRE-BALL**, in the art of war, a composition of meal-powder, sulphur, salt-petre, pitch, &c. about the bigness of a hand-grenade, coated over with flax, and primed with a slow composition of a fusee. This is to be thrown into the enemy's works in the night time, to discover where they are: or to fire houses, galleries, or blinds of the besiegers; but they are then armed with spikes or hooks of iron, that they may not roll off, but stick or hang where they are designed to have any effect.

**FIRE-LOCK**. See **GUN**, **MUSQUET**, &c.

**FIRE-MASTER**, in our train of artillery, an officer, who gives the directions and proportions of ingredients for each composition required in fire-works, whether for the service of war, or for rejoicings and recreations.

His orders are given to the fire-workers and bombardiers, who must execute them.

**FIRE-POTS**, in the military art, small earthen pots, into which is put a charged grenade, and over that powder enough till the grenade is covered; then the pot is covered with a piece of parchment, and two pieces of match across lighted: this pot being thrown by a handle of match, where it is designed, it breaks and fires the powder, and burns all that is near it, and likewise fires the powder in the grenade, which ought to have no fuse, to the end its operations may be the quicker.

**FIRE-WORKERS**, officers subordinate to the fire-master.

**FIRE-WORKS**. See **PYROTECHNIA**.

**FIRE-SHIP**, in the navy, a vessel charged with artificial fire-works, which having the wind of an enemy's ship, grapples her, and sets her on fire.

**FIRE-BARRE**,

**FIRE-BARE**, in our old customs, signifies a beacon, or tower, by the sea-side, wherein there were kept continual lights.

**FIRE-BOTE** is fuel or firing for necessary use, allowed to tenants, out of the lands granted to them.

**FIRE-COCKS**. Churchwardens in London and within the bills of mortality, are to fix fire-cocks at proper distances in streets, and keep a large engine and hand-engine for extinguishing fire, under the penalty of 10l. stat. 6 Annæ, cap. xxxi.

On the breaking out of any fire in London and Westminster, the constables and headles of parishes shall repair to the place with their slaves, and assist in extinguishing it, and cause the people to work for that end, &c.

**FIRE-OFFICE**, an office of insurance from fire. See ASSURANCE.

**FIRE-ENGINE**. See the article ENGINE.

**Wild-FIRE**, a kind of artificial or factitious fire, which burns even under water, and that with greater violence than out of it. It is composed of sulphur, naphtha, pitch, gum, and bitumen; and is only extinguishable by vinegar mixed with sand and urine, or by covering it with raw hides. Its motion or tendency is said to be contrary to that of natural fire, and it always follows the direction in which it is thrown, whether it be downwards, sideways, or otherwise.

Several are of opinion that the antient Greeks and Romans used this fire in their engagements at sea: whether or not that was the case, it was applied against the Saracens in a sea-fight, commanded by Constantine Pogonates, in the Helespont, and with such effect that he burnt the whole fleet therewith, wherein there were thirty thousand men.

**Electrical FIRE**. See ELECTRICITY.

**FIRING-IRON**, in farriery, an instrument not unlike the blade of a knife; which being made red-hot, is applied to a horse's hams, or other places standing in need of it, as in preternatural swellings, farcy knots, &c. in order to discuss them. Sometimes this is done for wrenches of the patterns.

**FIRKIN**, an english measure of capacity, for things liquid, being the fourth part of the barrel: it contains 8 gallons of ale, soap, or herrings; and 9 gallons of beer. See MEASURE and BARREL.

**FIRLOT**, a dry measure used in Scotland. The oat-firlot contains  $21\frac{1}{4}$  pints of that country; the wheat-firlot contains about 2211 cubical inches; and the barley-

firlot, 31 standard pints. Hence it appears that the scotch wheat-firlot exceeds the english bushel by 33 cubical inches. See the article MEASURE.

**FIRMAMENT**, in the ptolemaic astronomy, the eighth heaven or sphere, with respect to the seven spheres of the planets which it surrounds. It is supposed to have two motions; a diurnal motion, given to it by the primum mobile, from east to west, about the poles of the ecliptic; and another opposite motion from west to east, which last it finishes, according to Tycho, in 25412 years, according to Ptolemy in 36000, and according to Copernicus in 25800, in which time the fixed stars return to the same points in which they were at the beginning. This period is commonly called the Platonic year, or the great year. *Trevoux.*

**FIRMAMENT** is also used in divers places of scripture, to denote the middle region of the air. Several of the antients have believed, with the modern philosophers, that the firmament is a fluid matter; but certainly those who gave it the name of firmament, thought it a solid matter.

**FIRMAN** is a passport or permit granted by the great mogul to foreign vessels, to trade within the territories of his jurisdiction.

**FIRMNESS**, *firmitas*, denotes the consistence of a body, or that state wherein its sensible parts cohere in such a manner, that the motion of one part induces a motion of the rest.

Many of the cartesians maintain, that firmness consists in the mere rest of the particles of a body, and their mutual immediate contact, alledging that a separation of parts can only arise from some matter interposed between them, which matter is excluded by the notion of contiguity. But the insufficiency of this hypothesis is obvious; and the firmness of all bodies is known to depend on the connection or cohesion of their particles. See the articles ATTRACTION, COHESION, &c.

**FIRST-FRUIT**, *primitia*, among the Hebrews, were oblations of part of the fruit of the harvest, offered to God as an acknowledgment of his sovereign dominion. The first of these fruits was offered in the name of the whole nation, being either two loaves of bread, or a sheaf of barley which was threshed in the court of the temple. Every private person was also obliged to bring his first-fruits to the temple, and these consisted

of wheat, barley, grapes, figs, apricots, olives, and dates.

There was another sort of first-fruits which were paid to God. When bread was kneaded in a family, a portion of it was set apart, and given to the priest or levite who dwelt in the place: if there was no priest or levite there, it was cast into the oven, and consumed by the fire. These offerings made a considerable part of the revenues of the hebrew priesthood.

First fruits are frequently mentioned in ancient christian writers as one part of the church-revenue. One of the councils of Carthage enjoins that they should consist only of grapes and corn, which shews that this was the practice of the african church.

**FIRST-FRUITs**, in the church of England, are the profits of every spiritual benefice for the first year, according to the valuation thereof in the king's books. See the article **ANNATES**.

**FIRST-MOVER**, *primum mobile*. See the article **PRIMUM MOBILE**.

**FISC**, *fiscus*, in the civil law, the treasury of a prince. It differs from the *crarium*, which was the treasury of the public or people: thus, when the money arising from the sale of condemned persons goods, was appropriated for the use of the public, their goods were said *publicari*; but when it was destined for the support of the prince, they were called *confiscari*.

**FISCAL**, in the civil law, something relating to the pecuniary interest of the prince or people. The officers appointed for the management of the fisc, were called *procuratores fisci*, and *advocati fisci*; and among the cases enumerated in the constitutions of the empire, where it was their business to plead, one is against those who have been condemned to pay a fine to the fisc on account of their litigiousness, or frivolous appeals.

**FISGUM**, a fish more usually called misgum. See the article **MISGUM**.

**FISH**, in natural history, constitutes a class of animals which have no feet, but always fins; add to this, that their body is either altogether naked, or only covered with scales; and that they are aquatic animals, which live mostly, if not always, in water.

This class is subdivided by authors into five series, or orders.

1. The plagiuri or cetaceous fishes, comprehending those who have the tail not perpendicular, like all other fishes, but

placed in an horizontal direction, or parallel to the horizon. 2. Chondropterygious fishes, comprehending those with perpendicular tails, and the rays of the fins not bony, but cartilaginous. 3. Branchioflegious fishes, or those which have perpendicular tails, the rays of the fins bony, and the branchiæ or gills not ossiculated. 4. Acanthopterygious fishes, or those with perpendicular tails, and the rays of the fins bony, and prickly at the ends. 5. Malacopterygious fishes, or such as have perpendicular tails, with the rays bony, but not prickly at their ends. See **PLAGIURI**, &c. and plate of ichthyology, where a fish of each series is delineated, in the same order as above.

Some distinguish fishes, from the place where they are found, into sea-fish, river-fish, and lake or pond-fish. Others again divide them into cetaceous, cartilaginous, and spinose. The cetaceous, or whale-kind, called *bellua marina*, have lungs, and breathe like quadrupeds; they copulate also like them, and conceive and bring forth their young alive, whom they suckle with their milk. The cartilaginous kind are produced from large eggs, like birds, which are excluded the womb also like those of birds. The spinose kind are also oviparous, but their eggs are smaller, and have spines up and down in their flesh, to strengthen it.

Willughby thinks it would be better to distinguish fishes, first, into the cetaceous kind, or those that breathe with lungs; and those that breathe with gills: then to subdivide those that breathe with gills, not into cartilaginous and spinose, but into oviparous and viviparous; with other the like subdivisions. But the division first laid down, is that followed by the best ichthyologists, Artedi, Linnæus, and others.

As to the structure of fishes, it is admirably adapted to the element in which they live. their fins, tail, gills, air-bladder, eyes, figure, &c. are all such as best suit their circumstances; for the description and uses of which, see the articles **FIN**, **TAIL**, &c.

**FISH**, in commerce. The exporter, on making oath that they were british taken, and really exported, is entitled to the following bounties, to be paid by the collector of the salt-duty, at the port of exportation, within thirty days after demand, upon a debenture prepared by the collector of the customs, *viz.*

Pilchards, or scads, the cask, containing 50 gallons,	s. d.	7 0
Cod, { if 14 inches or upwards in length, from the bone in the fin to the 3 <sup>d</sup> joint in the tail, the 100 wet, the barrel, containing 32 gallons, dried, the hundred wt.	5 0	2 0
Ling, or {	3 0	4 6
Hake {	2 8	1 9
Salmon, the barrel, containing 42 gallons	1 0	1 0
White herrings, the barrel, containing 32 gallons,	1 0	1 0
Full red herrings, the barrel as above	1 0	1 0
Clean shotten red herrings, the barrel as above,	1 0	1 0
Dried red sprats, the last	1 0	1 0
Fifth of all sorts, taken by foreigners, and imported in foreign ships, are forfeited, together with the ship, except stock-fish, live eels, sturgeon, botargo or cavear, and anchovies. And, by 1 Geo. I. cap. xviii. salmon taken in great rivers, and sea-fish fold, are to be of certain lengths, or the takers shall forfeit 5 l. and the sellers 20 s. besides the fish.		

*Generation of FISHES.* See the article GENERATION.

*Breeding of FISHES* may be turned to great advantage; for besides furnishing your table, obliging your friends, and raising money, your land will be thereby greatly improved, so as to yield more this way than by any other employment whatever.

When fish are fed in large pools or ponds, either malt boiled, or fresh grains, is the best food; thus carps may be raised and fed like capons, and tenches will feed as well.

The care of feeding them is best committed to a gardener, or the butler, who should be always at hand. In a stew, any sort of grain boiled, especially peas, and malt coarse ground; also the grains after brewing, whilst fresh and sweet: but one bushel of malt not brewed, will go as far as two of grains. See the article FISH-POND, *infra*.

*Royal FISHES.* See the article ROYAL.

*FISH*, in a ship, a plank or piece of timber, fastened to a ship's mast or yard, to strengthen it, which is done by nailing it on with iron-spikes, and wounding or winding ropes hard about them.

*FISHES, pîces*, in astronomy. See the article PISCES.

*FISHES*, in heraldry, are the emblems of silence and watchfulness, and are borne

either upright, imbowed, extended, endorsed respecting each other, surmounting one another, fretted, &c.

In blazoning fishes, those borne feeding, should be termed devouring; all fishes borne upright and having fins, should be blazoned haughty; and those borne transverse the escutcheon, must be termed naiant.

*FISH-BLOCK*, in a ship. See BLOCK.

*FISH-GARTH*, a wear or dam in a river, for catching of fish. See WEAR.

*FISH-SHELLS*, in husbandry. See SHELLS.

*FISH-PONDS*, those made for the breeding or feeding of fish.

Fish-ponds are no small improvement of watry and boggy lands, many of which are fit for no other use. In making of a pond, its head should be at the lowest part of the ground, that the trench of the flood-gate or sluice, having a good fall, may not be too long in emptying. The best way of making the head secure, is to drive in two or three rows of stakes above six feet long, at about four feet distance from each other, the whole length of the pond-head, whereof the first row should be rammed at least about four feet deep. If the bottom is false, the foundation may be laid with quick-lime, which flacking, will make it as hard as a stone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and stakes; and when these are well covered, drive in others, as they see occasion, ramming in the earth as before, till the pond-head be of the height designed.

The dam should be made sloping on each side, leaving a waste to carry off the overabundance of water in times of floods or rains; and as to the depth of the pond, the deepest part need not exceed six feet, rising gradually in shoals towards the sides, for the fish to sun themselves, and lay their spawn. Gravelly and sandy bottoms, especially the latter, are best for breeding; and a fat soil with a white fat water, as the washings of hills, commons, streets, sinks, &c. is best for fattening all sorts of fish. For storing a pond, carp is to be preferred for its goodness, quick growth, and great increase, as breeding five or six times a year. A pond of an acre, if it be a feeding and not breeding one, will every year feed two hundred carps of three years old, three hundred of two years old, and four hundred of a year old. Carps delight in ponds that have marl or clay-bottoms, with

plenty of weeds and grafs, whereon they feed in hot months.

Your pond ſhould be drained every three or four years, and your fiſh ſorted. If it is a breeding one, the ſmaller ones are to be taken out, to ſtore other ponds with; leaving a good ſtock of females, at leaſt eight or nine years old, as they never breed before that age. In feeding ponds, it is beſt to keep them pretty near of a ſize.

**FISHERY**, a place where great numbers of fiſh are caught.

The principal fiſheries for ſalmon, herring, mackrel, pilchards, &c. are along the coaſts of England, Scotland, and Ireland; for cod on the banks of Newfoundland; for whales, about Greenland; and for pearls, in the Eaſt and Weſt-indies.

**FISHERY** denotes alſo the commerce of fiſh, more particularly the catching them, for ſale.

Were we to enter into a very minute and particular conſideration of fiſheries, as at preſent eſtabliſhed in this kingdom, this article would ſwell beyond its proper bounds; becauſe to do juſtice to a ſubject of that concernment to the britiſh nation, requires a very ample and diſtinct diſcuſſion. We ſhall, however, obſerve, that ſince the divine providence has ſo eminently ſtored the coaſts of Great Britain and Ireland with the moſt valuable fiſh; and ſince fiſheries, if ſucceſſful, become permanent nurſeries for breeding expert ſea-men; it is not only a duty we owe to the ſupreme being, not to deſpiſe the wonderful plenty he hath afforded us, by neglecting to extend this branch of commerce to the utmoſt; but it is a duty we owe to our country, for its natural ſecurity, which depends upon the ſtrength of our royal navy. No nation can have a navy, where there is not a fund of buſineſs to breed and employ ſea-men, without any expence to the public, and no trade is ſo well calculated for training up theſe uſeful members of this ſociety, as fiſheries.

The ſituation of the britiſh coaſts is the moſt advantageous for catching fiſh in the world; the ſcotiſh iſlands, particularly thoſe to the north and weſt, lie moſt commodious for carrying on the fiſhing trade to perfection; for no country in Europe can pretend to come up to Scotland in the abundance of the fineſt fiſh, with which its various creeks, bays, rivers, lakes, and coaſts are replenished. King Charles I.

was ſo ſenſible of the great advantage to

be derived from fiſheries, that he began the experiment, together with a company of merchants; but the civil wars ſoon occaſioned that project to be ſet aſide. King Charles II. made a like attempt, but his preſſing wants made him withdraw what money he had employed that way, whereupon the merchants that joined with him, did ſo too. Since the union, ſeveral attempts have been made to retrieve the fiſheries, and a corporation ſettled to that effect, intitled the Royal Britiſh Fiſhery.

In the year 1750, the parliament of Great Britain taking the ſtate of the fiſheries into conſideration, an act was paſſed for the encouragement of the white-herring fiſhery, granting a charter, whereby a corporation is created, to continue twenty-one years, by the name of the Society of the Free Britiſh Fiſhery, to be under the direction of a governor, preſident, vice-preſident, council, &c. who are to continue in office the ſpace of three years, with power to make bye-laws, &c. and to raiſe a capital of 500,000l. by way of ſubſcription. And any number of perſons, who, in any part of Great Britain, ſhall ſubſcribe 10,000l. into the ſtock of this ſociety, under the name of the Fiſhing Chamber, and carry on the ſaid fiſhery on their own account of profit and loſs, ſhall be intitled to the ſame bounty allowed to the ſociety. The bounty is 30s. the tun, to be paid yearly, for fourteen years, beſides 3 per cent. for the money advanced by each chamber. The act contains other proper regulations relative to the nets, marks on the herring-barrels, numbers of hands, and the quantity of ſalt that is intitled to the bounty, &c. It is then by the encouragement given by this act, that we now ſee a laudable emulation prevailing all over the two kingdoms, and fiſhing buſſes fitted out from almoſt every port, in order to repair to the Shetland iſlands, where the herring-fiſhery is carried on with an ardor becoming ſo important a branch of trade. Scotland, which ſuffered incredibly from the neglect of this valuable and natural produce of the ſeas, has not been backward to join in a ſcheme that tends ſo evidently to its own advantage; for the cities of Edinburgh and Glaſgow, the towns of Montroſe, Dundee, Perth, Inverneſs, and ſome other boroughs, have raiſed the proper ſum, and chambers have been erected in each of them; the gentlemen of eſtates adjoining to the reſpective places above-mentioned, liberally contributing with

merchants,



merchants, towards the prosecution of an undertaking so visibly tending to the good of their country in general.

**Anchorvy-FISHERY.** Anchovies are fished on the coast of Provence, in the months of May, June, and July, at which season shoals of this fish regularly come into the Mediterranean through the straits of Gibraltar. They are likewise found in plenty in the river of Genoa, on the coast of Sicily, and on that of the island of Gorgone opposite to Leghorn; these last are reckoned the best. It is remarkable, that anchovies are seldom fished but in the night-time. If a fire be kindled on the poop of the vessels used for this fishing, the anchovies will come in greater numbers into the nets; but then it is asserted, that the anchovies taken thus by fire, are neither so good nor so firm, and will not keep so well, as those which are taken without fire. When the fishery is over, they pull off the heads of all the anchovies, gut them, and afterwards range them in barrels of different weights, the largest of which do not weigh above 25 or 26 pounds, and they put a good deal of salt in them. Some also pickle them in small earthen pots made on purpose, of two or three pounds weight more or less, which they cover with plaster, to keep them the better.

**Cod-FISHERY.** There are two kinds of cod-fish, the one green or white cod, and the other dried or cured cod, tho' it is all the same fish differently prepared; the former being sometimes salted and barrell'd, then taken out for use; and the later having lain some competent time in salt, dried in the sun or smoke. We shall therefore speak of each of these apart, and first of

**Green cod-FISHERY.** The chief fisheries for green cod are in the Bay of Canada, on the great bank of Newfoundland, and on the isle of St. Peter, and the isle of Sable, to which places vessels resort from divers parts both of Europe and America. They are from 100 to 150 tons burden, and will catch between 30 and 40 thousand cod each. The most essential part of the fishery, is to have a master who knows how to cut up the cod, one who is skilled to take the head off properly, and above all, a good salter, on which the preserving them, and consequently the success of the voyage, depends. The best season is from the beginning of February to the end of April; the fish which in the winter retire to the deepest

water, coming then on the banks, and fattening extremely. What is caught from March to June keeps well, but those taken in July, August, and September, when it is warm on the banks, are apt to spoil soon. Every fisher takes but one at a time: the most expert will take from 350 to 400 in a day, but that is the most, the weight of the fish and the great coldness on the bank fatiguing very much. As soon as the cod are taken, the head is taken off; they are opened, gutted and salted, and the salter stows them in the bottom of the hold, head to tail, in beds a fathom or two square; laying layers of salt and fish alternately, but never mixing fish caught on different days. When they have lain thus three or four days to drain off the water, they are replaced in another part of the ship, and salted again; where they remain till the vessel is loaded. Sometimes they are cut in thick pieces, and put up in barrels for the convenience of carriage.

**Dry cod-FISHERY.** The principal fishery for dry cod, is from Cape Rose to the Bay des Exports, along the coast of Placentia, in which compass there are divers commodious ports for the fish to be dried in. These, tho' of the same kind with the fresh cod, are much smaller, and therefore fitter to keep, as the salt penetrates more easily into them. The fishery of both is much alike; only this latter is most expensive, as it takes up more time, and employs more hands, and yet scarce half so much salt is spent in this as in the other. The bait is herrings, of which great quantities are taken on the coast of Placentia. When several vessels meet and intend to fish in the same port, he whose shallop first touches ground, becomes intitled to the quality and privileges of admiral: he has the choice of his station, and the refusal of all the wood on the coast at his arrival. As fast as the masters arrive, they unrig all their vessels, leaving nothing but the shrouds to sustain the masts, and in the mean time the mates provide a tent on shore, covered with branches of trees, and falls over them, with a scaffold of great trunks of pines, twelve, fifteen, sixteen, and often twenty feet high, commonly from forty to sixty feet long, and about one third as much in breadth. While the scaffold is preparing, the crew are afishing, and as fast as they catch they bring their fish ashore;

ashore; open and salt them upon moveable benches; but the main salting is performed on the scaffold. When the fish have taken salt, they wash and hang them to drain on rails; when drained, they are laid on kinds of stages, which are small pieces of wood laid across, and covered with branches of trees, having the leaves stripped off, for the passage of the air. On these stages, they are disposed, a fish thick, head against tail, with the back uppermost, and are turned carefully, four times every twenty-four hours. When they begin to dry, they are laid in heaps ten or twelve thick, in order to retain their warmth; and every day the heaps are enlarged, till they become double their first bulk; then two heaps are joined together, which they turn every day as before; lastly, they are salted again, beginning with those first salted, and being laid in huge piles, they remain in that situation, till they are carried on board the ships, where they are laid on the branches of trees disposed for that purpose, upon the ballast, and round the ship, with mats to prevent their contracting any moisture.

There are four kinds of commodities drawn from cod, *viz.* the sound, the tongues, the roes, and the oil extracted from the liver. The first is salted at the fishery, together with the fish, and put up in barrels from 6 to 700 pound. The tongues are done in like manner, and brought in barrels from 4 to 500 pounds. The roes are also salted in barrels, and serve to cast into the sea to draw fish together, and particularly pilchards. The oil comes in barrels, from 400 to 520 pounds, and is used in dressing leather. The Scots catch a small kind of cod on the coasts of Buchan, and all along the Murray Firth on both sides; as also in the Firth of Forth, Clyde, &c. which is much esteemed. They salt and dry them in the sun upon rocks, and sometimes in the chimney. They also cure skait, and other smaller fish in the same manner, but most of these are for home-consumption.

**Coral-Fishery.** See CORAL-FISHERY. **Herring-Fishery.** Herrings are chiefly found in the north sea. They are a fish of passage, and commonly go in shoals, being very fond of following fire or light, and in their passage they resemble a kind of lightning. About the beginning of June, an incredible shoal of herrings, probably much larger than the

land of Great-Britain and Ireland, come from the north on the surface of the sea; their approach is known by the hovering of sea fowl in expectation of prey, and by the smoothness of the water; but where they breed, or what particular place they come from, cannot be easily discovered. As this great shoal passes between the shores of Greenland and the north cape, it is probably confined, and as it reaches the extremities of Great Britain, is necessarily divided into two parts. For we find one part of the herrings, steering west, or south-west, and leaving the islands of Shetland and Orkney to the left, pass on towards Ireland, where being interrupted a second time, some keeping the shore of Britain, pass away south down St. George's channel; while the other part edging off to the south-west, coast the western ocean, till they reach the south shore of Ireland, and then steering south-east, join the rest in St. George's channel. The other part of the first division made in the north, parting a little to the east and south-east, pass by Shetland, and then make the point of Buchan-ness, and the coast of Aberdeen, filling as they go, all the bays, firths, creeks, &c. with their innumerable multitudes. Hence they proceed forward, pass by Dunbar, and rounding the high shores of St. Abbe's Head, and Berwick, are seen again off Scarborough; and even then not diminished in bulk, till they come to Yarmouth-Roads, and from thence to the mouth of the Thames, after which, passing down the British Channel, they seem to be lost in the western ocean.

The vast advantage of this fishery to our nation is very obvious, when we consider that tho' herrings are found upon the shores of north America, they are never seen there in such quantities as with us, and that they are not to be met with in considerable numbers in any of the southern kingdoms of Europe as Spain, Portugal, or the south parts of France on the side of the ocean, or in the Mediterranean, or on the coast of Africa. There are two seasons for fishing herring, the first from June to the end of August, and the second in autumn, when the fogs become very favourable for this kind of fishing. The Dutch begin their herring-fishing on the 24th of June, and employ no less than two thousand vessels therein called busses, being between forty-five and sixty tons burden, and carrying three

at four small cannon. They never stir out of port without a convoy, unless there be enough together to make about eighteen or twenty cannon among them, in which case they are allowed to go in company. Before they go out, they make a verbal agreement, which has the same force as if it were in writing. The regulations of the admiralty of Holland are partly followed by the French, and other nations, and partly improved and augmented with new ones, as, that no fisher shall cast his net within a hundred fathoms of another boat: that while the nets are cast, a light shall be kept on the hind part of the vessel: that when a boat is by any accident obliged to leave off fishing, the light shall be cast into the sea: that when the greater part of a fleet leaves off fishing, and casts anchor, the rest shall do the same, &c. By the late act of parliament in Great Britain, the regulations are, that every vessel intitled to the bounty, must carry twelve Winchester bushels of salt in new barrels, for every last of fish such vessel is capable of holding; and as many more new barrels as such vessels can carry; and two fleets of tanned nets, that is, a vessel of seventy tons shall carry one fleet of fifty nets, each net to be thirty yards full upon its rope, and seven fathoms deep; and so in proportion for greater or smaller vessels; and be provided with one other fleet of fifty like nets, on board a tender, or left on shore in a proper place for the use of the said vessel, &c.

There is nothing particular in the manner of fishing. The nets wherein the fish are drawn, should regularly have their meshes an inch square to let all the lesser fry go through.

*Curing and preparing Herring.* The commerce of herring both white or pickled, and red, is very considerable. The white Dutch herrings are the most esteemed, being distinguished into four sorts, according to their sizes; and the best are those that are fat, fleshy, firm, and white, salted the same day they are taken, with good salt and well barrelled. The british herrings are little inferior, if not equal to the Dutch, for in spite of all their endeavours to conceal the secret, their method of curing, lasting, or casking the herrings, has been discovered and is as follows. After they have hawled in their nets, which they drag in the sterns of their vessels backwards and forwards in

traversing the coast, they throw them upon the ship's deck, which is cleared of every thing for that purpose: the crew is separated into sundry divisions, and each division has a peculiar task: one part opens and guts the herrings, leaving the melts and roes: another cures and salts them, by lining or rubbing their inside with salt: the next packs them, and between each row and division they sprinkle handfuls of salt: lastly, the cooper puts the finishing hand to all by heading the casks very tight, and stowing them in the hold. It is customary with us to wash the herring in fresh water, and steep them twelve or fifteen hours, in a strong brine, before we proceed to barrel them.

*Red Herrings* must lie twenty-four hours in the brine, in as much as they are to take all their salt there, and when they are taken out, they are spitted, that is, strung by the head on little wooden spits, and then hung in a chimney made for that purpose. After which, a fire of brush-wood which yields a deal of smoke, but no flame, being made under them, they remain there till sufficiently smoked and dried, and are afterwards barrelled up for keeping.

*Mackrel-FISHERY.* The mackrel are found in large shoals in the ocean, but especially on the french and english coasts. They enter the english channel in April, and proceeding as the summer advances; about June, they are on the coasts of Cornwall, Suffex, Normandy, Picardy, &c. where the fishery is most considerable. They are taken either with a line or nets: the latter is preferable, and is usually performed in the night-time. They are pickled two ways, first by opening and gutting them, and cramming their bellies as hard as possible with salt, by means of a stick, and then laying them in rows at the bottom of the vessel, strewing salt between each layer. The second way is putting them directly into tubs full of brine, made of salt and fresh water, and leaving them to steep till they have taken salt enough to keep. After this, they are barrelled up and pressed close down.

*Pearl-FISHERY.* See PEARL FISHERY.

*Pilchard-FISHERY.* The chief pilchard fisheries are along the coasts of Dalmatia on the coast of Bretagne, and along the coasts of Cornwall and Devonshire. That of Dalmatia is very plentiful: that on the coasts of Bretagne employs annually about 300 ships. The pilchards caught

on our coasts, tho' bigger, are not so much valued as those on the coasts of France, owing principally to their not being so thoroughly cured. They naturally follow the light, which contributes much to the facility of the fishery: the season is from June to September. On the coasts of France they make use of the roes of the Cod-fish, as a bait; which thrown into the sea, makes them rise from the bottom, and run into the nets. On our coasts there are persons posted ashore, who spying by the colour of the water where the shoals are, make signs to the boats to go among them to cast their nets. When taken, they are brought on shore to a warehouse, where they are laid up in broad piles, supported with backs and sides; and as they are piled, they salt them with bay salt, in which lying to soak twenty or thirty days, they run out a deal of blood, with dirty pickle and bitterness: then they wash them clean in sea-water, and when dry, barrel and press them hard down to squeeze out the oil, which issues out at a hole in the bottom of the cask. The cornish men observe of the pilchard, that it is the least fish in size, most in number, and greatest for gain, of any they take out of the sea.

*Salmon-FISHERY.* The chief salmon fisheries in Europe are in England, Scotland, and Ireland, in the rivers, and sea-coasts adjoining to the river mouths. Those most distinguished for salmon in Scotland, are the River Tweed, the Clyde, the Tay, the Dee, the Don, the Spey, the Ness, the Bewley, &c. in most of which it is very common about the height of summer, especially if the weather happen to be very hot, to catch four or five score of salmon at a draught. The chief rivers in England for salmon are the Tyne, the Trent, the Severn, and the Thames. The fishing usually begins about January, and in Scotland, they are obliged to give over about the 15th of August, because, as it is then supposed the fish come up to spawn, it would be quite depopulating the rivers to continue fishing any longer. It is performed with nets, and sometimes with a kind of locks or weirs made on purpose, which in certain places have iron or wooden grates so disposed, in an angle, that being impelled by any force in a contrary direction to the course of the river, they may give way and open a little at the point of contact, and

immediately shut again, closing the angle. The salmon, therefore, coming up into the rivers, are admitted into these grates, which open, and suffer them to pass thro', but shut again, and prevent their return. Salmon are also caught with a spear, which they dart into him when they see him swimming near the surface of the water. It is customary likewise to catch them with a candle and lanthorn, or wisp of straw set on fire; for the fish naturally following the light, are struck with the spear, or taken in a net spread for that purpose, and lifted with a sudden jerk from the bottom. We make no mention of the method of catching salmon with a line or hook, because it is much the same with that explained under the article *Trout FISHING*.

*Curing Salmon.* When the salmon are taken, they open them along the back, take out the guts and gills, and cut out the greatest part of the bones, endeavouring to make the inside as smooth as possible, then salt the fish in large tubs for the purpose, where they lie a considerable time soaking in brine, and about October, they are packed close up in barrels, and sent to London, or exported up the Mediterranean. They have also in Scotland, a great deal of salmon salted in the common way, which after soaking in brine a competent time, is well pressed, and then dried in smoke: this is called kipper, and is chiefly made for home consumption, and if properly cured and prepared, is reckoned very delicious.

*Sturgeon-FISHERY.* The greatest sturgeon-fishery is in the mouth of the Volga, on the Caspian Sea, where the Muscovites employ a great number of hands, and catch them in a kind of inclosure formed by huge stakes, representing the letter Z, repeated several times. These fisheries are open on the side next the sea, and close on the other, by which means the fish ascending in its season up the river, is embarrassed in these narrow angular retreats, and so is easily killed with a harping-iron. Sturgeons, when fresh, eat deliciously, and in order to make them keep, they are salted or pickled in large pieces, and put up in cags from thirty to fifty pounds. But the great object of this fishery is the roe, of which the Muscovites are extremely fond, and of which is made the caviar or kavia, so much esteemed by the Italians. See the article *CAVEAR*.

*Whale-*

**Whale-FISHERY.** Whales are chiefly caught in the north sea : the largest fort are found about Greenland, or Spitzbergen. At the first discovery of this country, whales not being used to be disturbed, frequently came into the very bays, and were accordingly killed almost close to the shore, so that the blubber being cut off was immediately boiled into oil on the spot. The ships in these times, took in nothing but the pure oil and the fins, and all the business was executed in the country, by which means a ship could bring home the product of many more whales than she can according to the present method of conducting this trade. The fishery also was then so plentiful, that they were obliged sometimes to send other ships to fetch off the oil they had made, the quantity being more than the fishing ships could bring away. But time and change of circumstances have shifted the situation of this trade. The ships coming in such numbers from Holland, Denmark, Hamburgh, and other northern countries, all intruders upon the English, who were the first discoverers of Greenland, the whales disturbed, and gradually, as other fish often do, forsaking the place, were not to be killed so near the shore as before, but are now found, and have been so ever since, in the openings and spaces among the ice, where they have deep water, and where they go sometimes a great many leagues from the shore.

The whale-fishery begins in May, and continues all June and July ; but whether the ships have good or bad success, they must come away and get clear of the ice by the end of August ; so that in the month of September at farthest, they may be expected home ; but a ship that meets with a fortunate and early fishery in May, may return in June or July.

The manner of taking whales at present is as follows. As soon as the fishermen hear the whale blow, they cry out *fall ! fall !* and every ship gets out its long boat, in each of which there are six or seven men : they row till they come pretty near the whale, then the harpooner strikes it with his harpoon. This requires great dexterity, for through the bone of his head there is no striking, but near his spout there is a soft piece of flesh, into which the iron sinks with ease. As soon as he is struck, they take care to give him rope enough, otherwise, when he goes down, as he frequently does, he

would inevitably sink the boat : this rope he draws with such violence, that, if it were not well watered, it would by its friction against the sides of the boat, be soon set on fire. The line fastened to the harpoon is six or seven fathoms long, and is called the fore-runner : it is made of the finest and softest hemp, that it may slip the easier : to this they join a heap of lines of 90 or 100 fathoms each, and when there are not enough in one long-boat, they borrow from another. The man at the helm observes which way the rope goes, and steers the boat accordingly, that it may run exactly out before ; for the whale runs away with the line with so much rapidity, that he would overset the boat, if it were not kept straight. When the whale is stuck, the other long boats row before, and observe which way the line stands, and sometimes pull it ; if they feel it stiff, it is a sign the whale still pulls in strength ; but if it hangs loose, and the boat lies equally high before and behind upon the water, they pull it in gently, but take care to coil it so, that the whale may have it again easily if he recovers strength : they take care, however, not to give him too much line, because he sometimes entangles it about a rock, and pulls out the harpoon. The fat whales do not sink as soon as dead, but the lean one's do, and come up some days afterwards. As long as they see whales, they lose no time in cutting up what they have taken, but keep fishing for others : when they see no more, or have taken enough, they begin with taking off the fat and whiskers in the following manner. The whale being lashed along side, they lay it on one side, and put two ropes, one at the head, and the other in the place of the tail, which together with the fins is struck off, as soon as he is taken, to keep those extremities above water. On the off side of the whale are two boats to receive the pieces of fat, utensils and men that might otherwise fall into the water on that side. These precautions being taken, three or four men with irons at their feet, to prevent slipping, get on the whale, and begin to cut out pieces of about three feet thick, and eight long, which are hauled up at the capstane or windlass. When the fat is all got off, they cut off the whiskers of the upper jaw with an ax. Before they cut, they are all lashed to keep them firm, which also facilitates the cutting,

and prevents them from falling into the sea: when on board, five or six of them are bundled together, and properly stowed, and after all is got off, the carcass is turned adrift, and devoured by the bears, who are very fond of it. In proportion as the large pieces of fat are cut off, the rest of the crew are employed in slicing them smaller, and picking out all the lean. When this is prepared, they stow it under the deck, where it lies till the fat of all the whales is on board; then cutting it still smaller, they put it up in tubs in the hold, cramming them very full and close. Nothing now remains but to sail homewards, where the fat is to be boiled and melted down into train oil. See *Train OIL*.

It were in vain to speak in this place of the advantages that may be derived to Great Britain from the whale-fishery. We shall only remark, that the legislature think that trade of so great importance, as to grant a very considerable bounty for the encouragement of it; for every british vessel of 200 tons or upwards, bound to the Greenland-seas on the whale-fishery, if found to be duly qualified according to the act, obtains a licence from the commissioners of the customs to proceed on such voyage: and on the ship's return, the master and mate making oath that they proceeded on such voyage and no other, and used all their endeavours to take whales, &c. and that all the whale-fins, blubber, oil, &c. imported in their ship, were taken by their crew in those seas, there shall be allowed 40s. for every ton according to the admeasurement of the ship.

Besides these fisheries, there are several others both on the coasts of Great Britain and in the north seas, which although not much the subject of merchandize, nevertheless employ great numbers both of ships and men; as, 1. The oyster fishing at Colchester, Feverham, the Isle of Wight, in the Swales of the Medway, and in all the creeks between Southampton, and Chichester, from whence they are carried to be fed in pits about Weymouth, and other places. See the article *OYSTER*.

2. The lobster fishing all along the british channel, the firth of Edinburgh, on the coast of Northumberland, and on the coast of Norway, from whence great quantities are brought to London. And lastly, the fishing of the pot-fish, fin-fish, sea-unicorn, sea-horse, and the

seal, or dog-fish, all which are found in the same seas with the whales, and yield blubber in a certain degree; besides, the horn of the unicorn is as estimable as ivory, and the skins of the seals are particularly useful to trunkmakers.

**FISHING** in general, the art of catching fish, whether by means of nets, or of spears, lines, rods, and hooks. See the articles *NET*, *LINE*, *ROD*, &c.

By several statutes it is provided, that no persons shall fish in any pond or moat, without the owner's consent, on pain of three months imprisonment; nor shall any one take fish in a river without licence obtained from the owner, upon forfeiture of 10s. to the poor, and triple damages to the party aggrieved, to be levied by justices of the peace, by distress and sale of goods. The nets, and other implements, belonging to poachers, may be seized by the owners of rivers, &c.

Fishing performed with a rod, line, and hook, is called *angling*. See *ANGLING*.

*Carp-FISHING*, requires a world of patience, by reason they seldom bite in cold weather, and, in hot, the angler cannot be too early, or too late; but when they do bite, there is no fear of the hold. The baits proper for them, are the red worm in March, the cadew in June, and the grass-hopper in July, August, and September. See *CARP* and *BAIT*.

*Chub-FISHING*, is performed with a large bait, whether worm, snail, fly, cheele, &c. according to the season and time of the day; but the large yellow moth seems to be a favourite morsel of this fish. See the article *CHUB*.

*Cod-FISHING*. See *FISHERY*, *supra*.

*Dace-FISHING*, affords good sport, as they catch at any fly, particularly the stone-cadew, and may-fly, in the beginning of summer, and the ant-fly in June, July, August, &c. But to catch dace in winter, the bait is a white worm, with a large red head, found in ploughed lands. See the article *DACE*.

*Eel-FISHING*. The silver-eel may be caught with several sorts of baits, as powdered beef, garden-worms, lobbs, minnows, garbidge, &c. The night is the best time for this kind of fishing; throwing a line with good store of hooks, baited and well plumbed, into the places where eels resort, with a float to discover where the lines lie, that they may be taken up in the morning.

As to the method called bobbing and snig-

sniggling, it is only by means of a sick thrusting a baited hook into the holes where eels use to hide themselves. Some fish for eels with a three-forked spear jagged on the sides: this they strike into the mud, and if it chance to light where they lie, there is no fear of securing them. But to take the largest eels of all, the night hooks are to be baited with small roaches, and the hooks must lie in the mouth of the fish. See EEL.

*Flounder-FISHING*, in the months of April, May, June, and July, may be performed all day long, either in the stream, or still deep-water, but the stream is best; and the most proper baits are all sorts of red-worms, wasps, or gentles. See the article FLOUNDER.

*Gudgeon-FISHING*, may be performed with float, the hook being on the ground; or by hand, with a running line on the ground, without cork or float. A small red worm is the best bait for this fish, yet wasps, gentles, and cad-bits, will do very well; and, in order to gather them to the place, it may not be improper to stir the sand and gravel, above and below it, by which means they will bite faster, and with more eagerness. See the article GUDGEON.

*Herring-FISHING*. See the articles FISHERY, *supra*, and HERRING.

*Mackrel-FISHING*. See the article FISHERY, *supra*, and MACKREL.

*Pearch-FISHING*. The proper baits are a minnow, or little frog; but the best of all is a worm called a brandling. You may also angle for this fish with job worms, bobs, wasps, &c. If you row for a perch with a minnow, which of all baits yields the best sport to the angler, it must be alive, sticking the hook through the upper lip, or back-fin, letting it swim about midwater, or somewhat lower; for which end you ought to have an indifferent large hook, with a quill on your line; but some, with good success, have used a strong silk-line, and a hook armed with wire. If you fish with a frog, the hook must be fastened thro' the skin of the leg, toward the upper part thereof.

*Pike-FISHING*, is performed two ways, 1. By the ledger-bait, fixed in one certain place; which must be a living bait of fish or frog, as dace, roach, perch, and yellow frogs. 2. By the walking bait, with a troll and winch, so as to give the fish length enough to run off with the bait, then striking him with a smart jerk.

The rod must not be too slender at top; and the line should be of silk two yards and a quarter next the hook, and strongly armed with a wire about seven inches.

*Pilchard-FISHING*. See FISHERY, *supra*, and PILCHARD.

*Roach-FISHING*, is best performed, in April, with cads or worms; and, in summer, with white small snails, or flies; but then the baits should be under-water, for they will not bite at top. Some use a may-fly with good success; and, in autumn, a paste, made of the crumb of fine bread, will do very well. The manner of fishing for roach at London is peculiar. They take a strong cord, at the end of which is fastened a three pound weight; and a foot above the lead, a pack-thread of twelve feet is made fast to the cord; and to the pack-thread, at proper distances, they add twelve strong links of hair, with roach-hooks at them, baited with a white snail or periwinkle. Then holding the cord in their hands, the biting of the fish draws the pack-thread, and that the cord, which gives them notice what to do. By this means, they sometimes draw up half a dozen, and very commonly two or three at a draught.

*Salmon-FISHING*. See the articles FISHERY and SALMON.

*Sturgeon-FISHING*. See FISHERY and STURGEON.

*Tench-FISHING*, is best performed with large red worms, at which they will bite the more eagerly, if dipped in tar. Several other sorts of worms, and a paste made of brown bread, are also used for this purpose.

*Trout-FISHING*. The baits for this purpose are either natural or artificial, as earth worms, minnows, and fishing flies, both natural or artificial. Whatever worms are used, they answer best if kept some time in an earthen pot, with moss often changed in summer. If you fish for trout with hand on the ground, the hook is to be introduced into the worm a little above the middle, coming out again a little below; then draw the worm above the arming of the hook, making your first entrance at the tail end, that the point of the hook may come out at the head end. When you fish with minnows, take the whitest and middle-sized; and after putting the hook in at the mouth, and out at the gills, and drawing it thro' about three inches, slip it again into his mouth, so as the point and beard may

come out at the tail. This done, tie the hook and tail together with a fine white thread, and let the body of the minnow be almost straight upon the hook.

**FISSURE** of the bones, in surgery, is when they are divided either transversely or longitudinally, not quite through, but cracked after the manner of glass, by any external force. Fissures are not easily detected, since neither the senses of seeing, feeling, or hearing can give sight enough to determine any thing with certainty in this case. However, surgeons always suppose there is a fissure when there happen violent inflammations, suppurations, fistulæ, and caries, with excessive pain, after any external violence. When, from these symptoms, there appears to be a fissure, it is usual to apply the plaster used in fractures, placing splints above all. When the tumour becomes soft, it is to be laid open by incision, to let out the corrupted fluid; after which a tent should be put into the wound, dipped in some vulnerary unguent, using afterwards the bandage, which is applied in fractures accompanied with a wound. Some assert, that fissures, when just made, may be cured by the application of bandages, without the assistance of other remedies.

In fissures of the cranium, attended with no other bad symptoms, but white, yellow, or brown spots upon the face of the bone, it is sufficient to bore down to the diploe, and dress with some balsamic medicine; but where any violent symptoms come on, which shew that there is an extravasation of blood in the cavity of the cranium, the trepan is to be called in without delay. See the articles **CONTRA-FISSURE** and **EXTRAVASATION**.

**FISTULA**, in the antient music, an instrument of the wind-kind, resembling our flute, or flageolet. See **FLUTE**.

The principal wind-instruments of the antients, were the tibia and fistula. But how they were constituted, wherein they differed, or how they were played on, does not appear.

**FISTULA**, in surgery, a deep, narrow, and callous ulcer, generally arising from abscesses. See the article **ABSCESS**.

Fistulæ differ from sinuses in this, that the former are callous, the latter not. See the article **SINUS**.

Fistulas attack all parts of the body without exception, particularly the anus, the perinæum, and the foramen lacrymale.

**General treatment of FISTULAS.** As soon as you discover that ulcers are attended with fistulas, not yet become callous, the readiest way of curing them is to lay them open with the knife, to the very bottom, if it can be done with safety; and afterwards to cleanse and heal them: but if the patient will not agree to the use of the knife, let the fistula be cleansed with a proper injection. Tents should never be made use of, but where the opening of the fistula is so small as to be in constant danger of healing: and even in this case, the tent can scarcely be too short, nor the materials too soft.

The next thing to be observed is, to press the fundus as near the opening as possible. When the ulcer is cleansed, and the proper dressings applied, a small compress, or a slip of plaster, doubled in that form, should be clapped upon the part where you judge the fistula of the fistula to be seated, securing all with a bolster, plaster, and bandage; taking care to make the fastening tight upon the fundus: this will direct the matter contained within towards the opening, and the bottom will heal before the rest of the fistula.

If this method of cure is unequal to the intention of cleansing and healing, the knife is of the utmost service, especially if the fistula tends downwards, or takes such an irregular course, that the fundus cannot be pressed towards the opening. All the sinuses of the fistula being laid open by this operation, there is a passage made for a discharge of the corrupted matter, and then you can come at the diseased parts with your remedies.

**FISTULA in the anus**, is a sinuous ulcer, commonly arising from a phyma, or the internal hæmorrhoides. Fistulas which arise from the phyma are the worst, very painful, and hard to be cured, on account they penetrate deep into the interstices of the muscles, and then form sinuses; and the more remote the sinuses are from the anus, so much the worse, in regard they admit of no opening by incision.

Fistulas arising from the internal hæmorrhoides, are bred gradually betwixt the coats of the intestinum rectum, and have a small perforation near the verge of the anus; from whence there issues out a thin sanies, or ichor, without pain: but in process of time, the parts are attended with itching and excoriation, the orifices at last become callous, and some-

times



times for a time are shut up; and then at certain intervals break out again.

Unless these fistulas are attended with great molestation, such as an exorbitant evacuation of humours, with a foetor, or the like, they are in a great measure to be left to nature to be cured, as serving in manner of a drain, for the discharge of superfluous, peccant humours, in caco-chymical and cachectical bodies: these should rather be kept open; but simple fistulas, that are recent, may be cured without danger. When a fistula in the anus is so conditioned, that an operation may be performed without danger of injuring the sphincter muscle, so as to render it incapable of retaining the excrements, there are two ways of doing it, viz. either by a ligature, or incision.

By ligature it is to be done thus. Let the surgeon take a thread of silk, or some horse-hair, and thread it into the eye of a leaden, or tin probe, with which let him introduce the end of the thread into the fistula, and with the fore-finger of the other hand, being anointed with oil of roses, and thrust up into the anus, let him lay hold of the end of the probe, and draw forth the thread, and then tie the two ends together, as tight as the patient can well bear it; and thus by tying it afresh every day, somewhat freighter, it will cut quite through, and the fistula will be laid open; and after that the callus must be destroyed, and the ulcer healed, &c.

A more expeditious way is by making an incision with an instrument, after this manner. A hollow leaden probe is to be thrust into the fistula, till it penetrates into the intestinum rectum; and then the instrument being passed into the anus, with the guidance of a finger, the fistula is to be cut according to the direction of the conductor, yet taking care not to hurt the hæmorrhoid veins, to occasion an hæmorrhage. When the incision is made, a doffel is to be put in armed with the white of an egg, and astringent powders: the callus is to be destroyed with a powder made of burnt alum, præcipitate mercury, &c.

**FISTULA in the perinæum**, is usually the consequence of lithotomy, or making a puncture in the perinæum and bladder; or they may proceed from abscesses in the perinæum, near the urethra; or from a scirrhosity of the prostate gland; or from a wound, or ulcer, which can by no means be healed up, but the lips, be-

coming callous, form a fistula, through which the urine is sometimes preternaturally discharged.

The treatment of these fistulas is various, according to the habit and particular disposition of the parts affected. The general treatment is as follows. Let the callous lips of the fistula be cut off, and the parts brought together by a sticking plaster, after they have been dressed by some vulnerary balsam; over the plaster should be laid a narrow compress, on each side of the wound, and the whole retained by a strict bandage; which done, the patient's knees are to be tied together, and strict orders given him, to lie still in bed, that the lips of the wound may more easily unite with each other. For the first few days after the operation, the patient should be allowed very little drink, that he may not be often excited to make water, and the dressings should not be removed till the second or third day after the operation, or till the patient can contain his urine. For some time afterwards the patient must observe a strict regimen.

**FISTULA LACHRYMALIS**, a disease which attacks the great caruncle in the inward corner of the eye. See the article **EYE**. The first degree of this disease stops up the natural passage of the tears, and forces them to run down the cheek; the second is when pus is mixed with the tears, which proceeds sometimes from an opening in the skin, between the nose and the great corner of the eye; the last is when the pus has not only corroded the neighbouring parts, which are soft, but has affected the bone which lies underneath. This last sort of fistula sometimes turns cancerous, and Riverius advises not to meddle with it at all.

Whatever may be the cause of this disorder, whether the small-pox, or french disease, it always stops up the nasal conduit.

If the abscess is not open, a time must be chosen when it is fullest of pus. For this reason, the eye of the patient must be closed, and small long pieces of plaster must be put one upon another, across the eye-lids, from the puncta lachrymalia to the great angle of the eye. The superior branches of the canal being thus compressed, that nothing can pass that way, it will be amassed in the sack, and a place proper for an incision should then be pointed out. If the abscess is already open the orifice and the probe

will shew where it is to be dilated; which must be done by the bistoury, both above and below, from the superior part of the sack to the edge of the orbit. The sack being opened, it must be filled with dry lint, which may be taken away next day, and a pledgit dipt in a mild digestive applied, which must be repeated once or twice a day, according to the quantity of suppuration: when the suppuration begins to diminish at every dressing, a small probe must be introduced into the nasal canal, to dilate it a little, and to leave a passage for the tears and the pus. This method must be continued till the suppuration is almost ended; then it may be dressed superficially, with dry lint, or with a desiccative, which will complete the cure: after which it will be proper to wear a compressing bandage a few weeks longer to prevent its return. When the bone lies open; and it is necessary to penetrate into it, you must direct the instrument towards the nose, and not towards the nasal canal, for fear of entering the sinus maxillaris.

**FISTULAR, or FISTULOUS**, appellations given by surgeons to wounds and ulcers, which degenerate into fistulas. See the article **FISTULA**.

**FISTULAR**, among botanists, is applied to leaves and flowers that are tubular, or resemble a hollow pipe.

**FIT**, in medicine, denotes much the same with paroxysm. See **PAROXYSM**.

**FITS of easy reflection and transmission**, in optics. See the articles **REFLECTION** and **TRANSMISSION**.

**FITS of the mother**; the same with hysteric affection.

**FITCH**, or **FITCHOW**, in zoology, an animal more usually called putorius, and the pole-cat. See **PUTORIUS**.

**FITCHEE**, in heraldry, a term applied to a cross, when the lower end of it is sharpened into a point, as in plate **XCIII. fig. 3.**

Crosses are sometimes fitched by only a point going out from the broad foot thereof, and sometimes they go tapering away from the center to the point, in which case it is said to be fitched on the fourth part. The reason of this cross's being so painted, Mackenzy supposes to be, that as the primitive Christians were wont to carry crosses with them where-soever they went for devotion, when they settled themselves in their journey, at any place, they might fix these portable crosses in the ground.

**FITCHES**, in husbandry, a sort of pulse, more generally known by the name of chick pea; or cicer. See **CICER**.

Fitches are cultivated either for feeding cattle, or improving the land. They make a wholesome and nourishing food, whether given in the straw, or threshed out. When sown only to improve the soil, they are plowed in just as they begin to blossom, by which means a tough stiff clay soil is much enriched.

**FITZ**, makes part of the surname of some of the natural sons of the kings of England, as Fitz-roy; which is purely French, and signifies the king's son.

**FIVE CHURCHES**, a bishop's See of Lower Hungary, 76 miles south of Buda.

**FIVES**, or **VIVES**, in farriery. See the article **VIVES**.

**FIUME**, or **St. VEIT**, a port-town of Istria, subject to the house of Austria: east long. 15°, and north lat. 45° 45'.

**FIXATION**, in chemistry, the rendering any volatile substance fixed, so as not to fly off upon being exposed to a great heat; hence,

**FIXED BODIES** are those which bear a considerable degree of heat without evaporating, or losing any of their weight.

Gold is the most fixed of all metals. A quantity of very pure gold, after being placed in the eye of a glass furnace for two months, was found not to have lost any sensible part of its weight.

However, gold itself, exposed on a piece of charcoal to the focus of a burning-glass, is found to diminish; and, in proportion to this diminution, there arise an infinite number of little glassy drops of a greenish colour, which swell and enlarge as the gold disappears. But this, say some, is no demonstration that the gold is vitrified: it is rather the ashes of the coal; because, if the gold be evaporated on a body which yields no ashes, you have no glass. Be this as it will, the experiment shews that gold may be evaporated; and since gold is not fixed, we may safely conclude, that there is no body absolutely so. See the articles **GOLD** and **BURNING-GLASS**.

<b>FIXED MERCURY,</b>	} See {	<b>MERCURY.</b>
<b>FIXED NITRE,</b>		<b>NITRE.</b>
<b>FIXED SALTS,</b>		<b>SALT.</b>
<b>FIXED SIGNS,</b>		<b>SIGN.</b>
<b>FIXED STARS,</b>		<b>STAR.</b>

**FLACCIDITY**, among physicians, a disorder of the solids; cured by astringent and

and cardiac medicines, joined with exercise and good air.

**FLAG**, a general name for colours, standards, antients, banners, ensigns, &c. which are frequently confounded with each other. See **COLOUR**, &c.

The fashion of pointed, or triangular flags, as now used, Rod. Toletan assures, came from the mahometan Arabs, or Saracens, upon their seizing of Spain, before which time all the ensigns of war were stretched, or extended on cross pieces of wood, like the banners of a church. The pirates of Algiers, and throughout the coasts of Barbary, bear an hexagonal flag.

**FLAG** is more particularly used at Sea; for the colours, antients, standards, &c. borne on the top of the masts of vessels, to notify the person who commands the ship, of what nation it is, and whether it be equipped for war or trade, see plate XCIX.

The admiral in chief carries his flag on the main-top; the vice-admiral on the fore-top; and the rear-admiral on the mizzen-top.

When a council of war is to be held at sea, if it be on board the admiral, they hang a flag in the main shrouds; if in the vice-admiral, in the fore-shrouds; and if in the rear-admiral, in the mizzen shrouds.

Besides the national flag, merchant-ships frequently bear lesser flags on the mizzen mast, with the arms of the city where the master ordinarily resides; and on the fore-mast, with the arms of the place where the person who freights them lives.

**FLAG**, in French fanion, a small banner of distinction stuck in the baggage-waggons of the army, to distinguish the baggage of one brigade, or battalion, from that of another, that they may be marshalled by the waggon-master-general according to the rank of their brigades, where they are to keep during the march, to avoid confusion.

*To lower, or strike the FLAG*, is to pull it down upon the cap, or to take it in, out of the respect, or submission, due from all ships or fleets inferior to those any way justly their superiors. To lower or strike the flag in an engagement is a sign of yielding.

The way of leading a ship in triumph is to tie the flags to the shrouds, or the gallery, in the hind part of the ship, and let them hang down towards the water, and to tow the vessels by the stern.

Livy relates, that this was the way the Romans used those of Carthage.

*To heave out the FLAG*, is to put out, or put abroad, the flag.

*To hang out the white FLAG*, is to ask quarter; or it shews when a vessel is arrived on a coast, that it has no hostile intention, but comes to trade, or the like. The red flag is a sign of defiance, and battle.

**FLAG-OFFICERS**, those who command the several squadrons of a fleet, such are the admirals, vice-admirals, and rear-admirals.

The flag-officers in our pay, are the admiral, vice-admiral, and rear-admiral, of the white, red, and blue. See the article **ADMIRAL**.

**FLAG-SHIP**, a ship commanded by a general, or flag-officer, who has a right to carry a flag, in contradistinction to the secondary vessels under the command thereof.

**FLAG-STAVES**, are staves set on the heads of the top-gallant-masts, serving to let fly, or unfurl, the flag.

**FLAGS**, in falconry, are the feathers in a hawk's wing, near the principal ones.

**FLAG** is also used for sedge, a kind of rush; and for the upper part of turf, pared off to burn.

**FLAG-FLOWER**, in botany, a plant called by botanists iris. See **IRIS**.

**FLAG-WORM**, that found in flaggy or sedgey places. See the article **WORM**.

**Corn-FLAG**, in botany, the same with gladiolus. See the article **GLADIOLUS**.

*Sweet-scented FLAG*, a name sometimes given to the acorus or galangal. See the article **GALANGAL**.

**FLAGELLANTES**, **WHIPPERS**, in church-history, certain enthusiasts in the thirteenth century, who maintained, that there was no remission of sins without flagellation, or whipping. Accordingly, they walked in procession, preceded by priests carrying the cross, and publicly lashed themselves, till the blood dropped from their naked backs.

**FLAGELLARIA**, in botany, a genus of the *hexandria monogynia* class of plants, without any flower-petals; the perianthium is divided into six segments; and the fruit is a roundish berry, containing a single seed.

**FLAGEOLET**, or **FLAJOLET**, a little flute, used chiefly by shepherds, and country people. It is made of box, or other hard wood, and sometimes of ivory, and has six holes besides that at the bottom,

bottom, the mouth-piece, and that behind the neck. See the article FLUTE.

**FLAIL**, an instrument for threshing corn. See CORN and THRESHING.

A flail consists of the following parts, 1. The hand-staff, or piece held in the thresher's hand. 2. The swipec, or that part which strikes out the corn. 3. The caplins, or strong double leathers, made fast to the tops of the hand-staff and swipec. 4. The middle-band, being the leather-thong, or fish-skin, that ties the caplins together.

**FLAIR**, in the sea-language. When a ship is housed in near the water, so that the work above hangs over too much, it is said to flair over. This makes the ship more roomy aloft, for the men to use their arms.

**FLAIRE**, a species of ray-fish, more usually called skate. See SKATE.

**FLAKE**, among gardeners, a kind of striped carnations, with only two colours.

**FLAMBEAU**, a kind of large taper, made of hempen wicks, by pouring melted wax on their top, and letting it run down to the bottom. This done, they lay them to dry; after which they roll them on a table, and join four of them together by means of a red-hot iron; and then pour on more wax, till the flambeau is brought to the size required.

Flambeaus are of different lengths, and made either of white or yellow wax. They serve to give light in the streets at night, or on occasion of illuminations.

**FLAMBOROUGH-HEAD**, in geography, a cape or promontory of Yorkshire, five miles east of Burlington: east long. 20', north lat. 54° 15'.

The village of Flamborough has its name, as some think, from the word flame, because of a watch-tower here, with lights for the use of sailors.

**FLAME**, *flamma*, in physiology, the small parts of an inflammable or considerably unctuous body, that are set on fire, or briskly agitated and thrown off, with a certain vibrative motion at the surface of that body into the open air: or, in Sir Isaac Newton's words, the flame of a body is only the smoke thereof heated red hot; and the smoke is only the volatile part of the body separated by the fire. See FIRE and SMOKE.

Flame cannot exist without oil; whence it is that ashes, sand, glass, stones and earth, do not flame upon ignition, but rather damp and extinguish flame. As oil is then the only inflammable substance

in nature, we may be directed to the means of preventing conflagrations, by using such materials in buildings as contain little or no oil. And this direction might be likewise extended to the making incombustible paper, for valuable books and manuscripts, &c.

All flame catches and exists only on the surface of inflammable bodies: whence we are led to invent methods of casing or otherwise defending the wood-works of ships and buildings, from accidents by fire. All inflammable bodies, as sulphur, oil, wax, wood, &c. by flaming, waste and vanish into burning smoke; which smoke if the flame be hastily put out, is very thick and visible, and sometimes smells strongly; but in the flame, loses its smell by burning; and according to the nature of the smoke, the flame is of this or that colour: thus the flame of sulphur is blue; that of camphor, white; that of tallow, yellow, &c. When gun-powder takes fire, it goes off in a flaming smoke. Thence proceeds the difference of the colours of bodies, as viewed by day-light, candle-light, fire-light, sulphureous-light, &c.

As the pressure of the fire is greatest about the upper parts, and least towards the circumference of the base, whence the air finding least resistance from that part, drives the flame upwards; and as the fire is densest, and consequently strongest, about the middle, it thence follows, that the flame will rise higher from the middle of the fire than from its sides, where the quantity of fire is considerably lessened; and hence we see the reason of the pyramidal figure of flame.

**Vital FLAME**, a fine, warm, igneous substance, supposed, by some, to reside in the hearts of animals, as necessary to life; or rather as that which constitutes life itself.

To preserve this flame, they judge the air taken in by respiration, to be as necessary as it is to the conservation of ordinary flame. Others, however, not less to be depended on, find no more in the notion of a vital flame, than the natural warmth of the body, which is always as the velocity of the circulating blood, and is the effect of that circulation.

**FLAMEN**, in roman antiquity, the name of an order of priests, instituted by Romulus or Numa; authors not being agreed on this head.

They were originally only three, *viz.* the *flamen dialis*, *flamen martialis*, and *flamen*

flamen quirinus. They were chosen by the people, and installed by the sovereign pontiff. Afterwards, their number was increased to fifteen; the three first of whom were senators, and called flamines majores; the other twelve, taken from among the people, being denominated flamines minores.

The flamen dialis, or priest of Jupiter, was a considerable person at Rome; the flamen martialis, or priest of Mars, was the second in dignity; and the flamen quirinalis, was the next to him.

The greater flamens wore the robe edged with purple, like that of the great magistrates, had an ivory-chair, and sat in the senate. They wore a little band of thread (filamen) about their head; from whence, according to Varro, they had their name.

There were likewise flaminicæ, or priestesses, who were the wives of the flamines diales. These wore a flame-coloured habit, on which was painted the image of a thunder-bolt; and above their head-dress, they wore green oak boughs. They are often mentioned in inscriptions.

FLAMINGO, in ornithology, a bird otherwise called phœnicopterus. See the article PHœNICOPTERUS.

FLAMMA, or FLAMMULA JOVIS, in botany, a species of clematis, or virgin's bower. See the article CLEMATIS.

FLAMMULA, in antiquity, a kind of flag, so called from its pointed figure. It was painted of different colours, to distinguish the several battalions and companies from each other.

FLANCH, FLANQUE, or FLASQUE, in heraldry, an ordinary always borne double; being the segment of a circular superficies.

FLANDERS, a province of the Netherlands, bounded by the German sea and the United provinces, on the north; by the province of Brabant, on the east; by Hainault and Artois, on the south; and by another part of Artois and the German sea, on the west; being about sixty miles long, and fifty broad, and divided between the Austrians, the French, and the Dutch.

Flanders is a perfectly champaign country, with not a rising ground or hill in it, and watered with many fine rivers and canals. Its chief commodities are fine lace, linnen, and tapestry.

FLANEL, or FLANNEL, a loose sort of woollen stuff, not crossed, and wove on a loom with two treddles, like bays.

FLANK, in the manege, the side of a horse between the ribs and haunches. A well flanked horse, is one that has wide and well made ribs, and a good body.

FLANKS of an army, are the troops encamped on the right and left, as the flanks of a battalion are the files on the right and left.

FLANK of a bastion, in fortification, that part which joins the face to the curtain. See the article BASTION.

Engineers differ very much about raising the flank, some making it perpendicular to the face, some to the curtain, and others to the line of defence; some again make it an angle of 98° with the curtain, whereas Vauban makes it the chord of a segment, whose center is the angle of the shoulder of the next bastion. Its use is to defend the curtain, and the flank and face of the opposite bastion; to defend the passage of the moat, batter the salient angles of the counterscarp and glacis, from whence the besiegers ruin the flanks with their artillery, in order to take away the defence of the opposite bastion.

Oblique FLANK, or second FLANK, that part of the curtain, from whence the face of the opposite bastion may be discovered.

Retired FLANK, or low FLANK, or covered FLANK, one of the platforms of the cazemate. See the article CAZEMATE.

These retired flanks are a great defence to the opposite bastion, and to the passage of the moat, because the besiegers cannot see nor easily dismount their guns. The curtain is esteemed the strongest part of a fortification, because flanked at both ends; and the face is accounted the weakest, as having only one defence from the opposite flank.

FLANKED, *flanqué*, in heraldry, is used by the French to express our parti per saltier. See PARTI and SALTIER.

Coats, however, makes it to be the same with flanch. See the article FLANCH.

FLANKED ANGLE, in fortification, that formed by the two faces of a bastion.

FLANKING ANGLE, or *angle of the TENAILLE*, that composed of the two lines of defence, and pointing towards the curtain. See the article TENAILLE.

FLANKING line of defence. See the article LINE of defence.

FLASK, a horn, or the like, made for carrying of powder, having a measure for the charge of the piece for the top.

FLAT, in the sea-language. To flat in the fore-sail, is to hail it in by the sheet,

as near the ship's side as possible ; which is done, when a ship will not fall off from the wind.

**FLATS**, in music, a kind of additional notes, which, together with sharps, serve to remedy the defects of musical instruments, wherein temperament is required. See **TEMPERAMENT** and **SHARP**.

The natural scale of music being limited to fixed sounds, and adjusted to an instrument, the instrument will be found defective in many points ; and, particularly, in that we can only proceed from any note by one particular order of degrees ; that for this reason, we cannot find any interval required, from any note upwards or downwards ; and that a song may be so contrived, as that if it be begun by any particular note or letter, all the intervals, or other notes, shall be justly found on the instrument, or in the fixed series ; yet were the song begun with any other note, we could not so proceed. See the articles **SCALE** and **INTERVAL**.

To remove or supply this defect, musicians have recourse to a scale proceeding by twelve degrees, that is thirteen notes to an octave, including the extremes ; which makes the instrument so perfect, that there is but little reason to complain. This, therefore, is the present system or scale for instruments that have their sounds fixed, *viz.* betwixt the extremes of every tone of the natural scale, is put a sound or note, which divides it into two unequal parts, called semi-tones : hence the whole may be called the semi-tonic scale, containing twelve semi-tones betwixt thirteen notes, in the compass of an octave.

Now to preserve the diatonic series distinct, these inserted notes either take the name of the natural note next below, with the character  $\sharp$ , called a sharp ; or the name of the natural note next above it, with the character  $\flat$ , called a flat. Thus **D**  $\flat$ , or **D** flat, signifies a semi-tone below **D** natural ; and it is indifferent, in the main, whether the inserted note be accounted as a flat or sharp.

This semi-tonic series, or scale, is very exactly represented by the keys of the organ, &c. the lowermost range of keys being the natural or diatonic notes ; and those behind, the artificial ones, or the flats and sharps.

**FLATTING**, in gilding, is the giving the work a light touch, in the places not burnished, with a pencil dipt in size, in which

a little vermilion is sometimes mixt. This serves to preserve and prevent its flawing, when handled. See **GILDING**.

**FLATULENCY**, in medicine, a disorder of the bowels arising from a weak stomach, and crude flatulent aliment, as pease, beans, lentils, coleworts, hard fat flesh, and the like ; which degenerate into wind, creating great anxiety if not evacuated, and difficulty of breathing. Another cause of flatulencies are congestions of blood in the branches of the vena porta ; whence proceed anxieties of the præcordia, difficult breathing, colic pains, heart-burn, head-achs, vertigo, and watchfulness.

If the flatulency arises from crudities in the stomach, evacuations are first of all necessary ; after which may be given bitters, aromatics, carminatives, and strengtheners, with a spare diet and exercise. If it proceeds from congestions of blood, as is the case of hypochondriacs, a vein must be opened ; and if the body is costive, an emollient clyster or a gentle laxative will be proper. If these fail, chalybeate medicines are to be called in, as tincture of vitriol of iron, steel-filings finely powdered, from six to ten grains, or oil of cinnamon with sugar or bitters, spaw-waters, and constant exercise.

**FLATULENT TUMOURS**, in surgery. See the article **PNEUMATOCELE**.

**FLAUTINO**, in music, the same with flageolet. See the article **FLAGEOLET**.

**FLAW**, in the sea-language, signifies a sudden gust of wind.

**FLAX**, *linum*, in botany. See **LINUM**.

Flax is an excellent commodity, and the cultivation of it a good piece of husbandry. It will thrive in any sound land, but that which has lain long fallow is best ; which being well plowed, and laid flat and even, the seeds must be sown in a warm season, about the middle or end of March, or at farthest the beginning of April ; and if a wet season happen, weeding will be necessary. The best seed is that brought from the east country, which, tho' dear, yet easily repays the charge : this will last two or three crops, when it is advisable to renew the seeds again. Of the best seed, two bushels may serve for an acre ; but more must be allowed of home-feed, because it grows smaller. When grown up, it ought not to be gathered before it be fully ripe ; for if pulled before the blossom falls, it heckles away almost to nothing ; and, tho' in appearance very fine, yet it has

no substance, and the yarn spun of it is weak and ouzy: it not only wastes in the washing, but the linnen made of it grows extremely thin in the bleaching. The pluckers should be nimble, tie it up in handfuls, let them up till perfectly dry, and then house them. Flax pulled in the bloom, proves whiter and stronger than if left standing till the seed is ripe; but then the seed will be lost. An acre of good flax, is accounted worth from seven to twelve pounds, or more.

*Dressing of FLAX.* When flax has been watered, and twice swingled, as directed under the articles WATERING and SWINGLING, it is then to be heckled in a much finer heckle than that used for hemp. Hold the strike of flax stiff in your hand, and break it very well upon the coarse heckle; saving the hurds to make harden cloth of. This done, the strike is to be passed through a finer heckle, and the hurds coming from thence saved for middling cloth, and the tear itself for the best linnen.

But to dress flax for the finest use of all, after being handled as before, and laying three strikes together, plat them in a plat of three rows, as hard and close together as you can; joining one to the end of another, till you have platted as much as you think convenient: then begin another plat, and add as many several ones, as you think will make a roll; afterwards, wreathing them hard together, make up the roll; which done, put as many as you judge convenient into a hemp-trough, and beat them soundly, rather more than less than you do hemp. Next open and unplat them, dividing each strike very carefully from each other; and so strike it through the finest heckle of all, whereof there are three sorts.

Great care must be taken to do this gently and lightly, lest what is heckled from thence should run to knots; for if preserved soft like cotton, it will make very good linnen, each pound running at least two yards and an half. The tear itself, or finest flax, will make a strong and very fine holland, running at least five yards in the pound. See SPINNING.

In Scotland, they have a lint-mill, which greatly facilitates the dressing of flax; which if done by the hand, will cost 3d. the stone; whereas it may be dressed at the mill for 2s. the stone, which is one fourth saved.

*Laws, regarding FLAX and hemp.* Any person may set up the trade of breaking,

heckling, and dressing of flax or hemp; also of spinning, weaving, making, whitening, &c. cloth made of hemp or flax only; and that in all places, corporate or incorporate, privileged or not. Foreigners using the fore-said trades for three years, shall, upon taking the oaths to the government, enjoy all the privileges of natural subjects. Rough or undressed flax, imported from abroad, pays no duty; but that which is dressed or wrought, pays every hundred weight 4l. 10s. 5<sup>1</sup>/<sub>2</sub>d. whereof, upon exporting it, is drawn back 4l. 3s. 3<sup>1</sup>/<sub>2</sub>d. However, it is to be observed, that all manner of flax, wrought or unwrought, may be imported from Ireland free of all duty, provided it be done in british or irish bottoms.

*Purging-FLAX, linum catharticum.* See the article LINUM.

*Toad-FLAX, linaria.* See LINARIA.

**FLEA**, *pulex*, in zoology, a genus of insects without wings, of a roundish, compressed figure: the legs are three pair; and formed for leaping: the eyes are two, and simple: the mouth is bent downwards: the colour is a deep purple, approaching to black.

The flea is an insect which infests birds, as well as quadrupeds, and lays eggs, called nits: these produce a kind of nymphs, or white worms; which after some time are transformed, in the manner of caterpillars, into perfect fleas.

**FLEA-BANE**, in botany, a name given to the plant called by authors conyza. It got the name of flea-bane, from its supposed virtue of killing fleas. See CONYZA.

*African FLEA-BANE*, a plant called by botanists parthenium. See PARTHENIUM.

*Sweet FLEA-BANE*, the same with the erigeron of botanists.

**FLEA-BITTEN**, that colour of a horse, which is white or grey, spotted all over with dark reddish spots. See HORSE.

**FLEA-WORT**, the english name of the pylum of botanists.

**FLEAM**, in surgery and farriery, an instrument for letting a man or horse blood.

A case of fleams, as it is called by farriers, comprehends six sorts of instruments; two hooked ones, called drawers, and used for cleaning wounds; a pen-knife; a sharp-pointed lancet, for making incisions; and two fleams, one sharp and the other broad-pointed. These last are somewhat like the point of a lancet, fixed in a flat handle, only no longer than is just necessary to open the vein.

Many of the german surgeons let blood

with a fleam, represented in plate XCVIII. fig 4. They hold the part B in their hand; and, applying the point A to the vein, strike the part C with one of the fingers of the other hand. Others use a neater instrument, or spring-fleam, represented *ibid.* n<sup>o</sup> 2. This being drawn up, they apply the point A to the vein, and then let it go by pressing upon B.

However, as the position and size of the veins are different in different persons, the lancet is found to be the most convenient instrument for this purpose. See the article LANCET.

Fleams imported, besides the duty on steel, pay each  $\frac{38\frac{1}{2}}{100}$ d. and draw back on

exportation  $\frac{33\frac{3}{4}}{100}$ d. See STEEL.

FLECHE, a town of France, under the meridian of London, twenty miles north-east of Angers.

FLEECE, the covering of wool, shorn off the bodies of sheep. See WOOL.

*Order of the golden FLEECE*, an order of knighthood instituted by Philip II. duke of Burgundy. These knights at first were twenty-four, besides the duke himself, who reserved the nomination of six more: but Charles V. increased them to fifty. He gave the guardianship of this order to his son Philip king of Spain, since which the spanish monarchs are chiefs of the order. The knights had three different mantles ordained them at the grand solemnity, the collar and fleece.

FLEET, commonly implies a company of ships of war, belonging to any prince or state: but sometimes it denotes any number of trading ships, employed in a particular branch of commerce.

In sailing, a fleet of men of war is usually divided into three squadrons; the admiral's, the vice admiral's, and the rear admiral's squadron, all which, being distinguished by their flags and pendants, are to put themselves, and, as near as may be, to keep themselves in their customary places, *viz.* The admiral, with his squadron, to sail in the van, that so he may lead the way to all the rest in the day-time, by the sight of his flag in the main-top-mast-head; and in the night-time, by his lights or lanterns. The vice admiral and his squadron, is to sail in the center, or middle of the fleet. The rear admiral, and the ships of his squadron, to bring up the rear. But sometimes other divisions are made, and

those composed of the lighter ships and the best sailors, are placed as wings to the van, center, and rear. See the articles SQUADRON, ADMIRAL, FLAG, &c. For the disposition of a fleet in time of a sea-engagement or battle. See the article BATTLE.

Merchant-fleets generally take their denomination from the place they are bound to, as the Turkey fleet, East-India fleet, &c. These, in time of peace, go in fleets for their mutual aid and assistance: in time of war, besides this security, they likewise procure convoys of men of war, either to escort them to the places whither they are bound, or only a part of the way, to a certain place or latitude, beyond which they are judged out of danger of privateers, &c. See CONVOY.

FLEET is also a noted prison in London, where persons are committed for contempt of the king and his laws, particularly of his courts of justice: or for debt, where any person will not, or is unable to pay his creditors.

There are large rules and a warden belonging to the fleet prison, which had its name from the float or fleet of the river or ditch, on the side whereof it stands.

FLEGM and FLEGMATIC. See the articles PHLEGM and PHLEGMATIC.

FLEMISH, or the FLEMISH TONGUE, is that which we otherwise call low Dutch, to distinguish it from the German, whereof it is a corruption, and a kind of dialect. See GERMAN.

It differs from the Walloon, which is a corruption of the french language. The flemish is used through all the provinces of the Netherlands.

FLEMISH BRICKS, a neat, strong, yellow kind of bricks, brought from Flanders, and commonly used in paving yards, stables, &c. being preferable for such purposes to the common bricks. See the article BRICK.

FLENSBURGH, a port-town subject to Denmark, sixteen miles north of the city of Sleswick.

FLESH, *caro*, in anatomy, a similar, fibrous part of an animal body, soft and bloody, being that whereof most of the other parts are composed, and whereby they are connected together: or more properly, it is such parts of the body where the blood-vessels are so small, as only to retain blood enough to preserve their colour red.

The antient anatomists reckoned five different kinds of flesh. 1. Musculous, fibrous



brous, or fistular flesh; such as is the substance of the heart and other muscles. 2. The parenchymous flesh, as that of the lungs, liver, and spleen: but since the use of glasses, it is plainly discovered that there is no such thing as a parenchyma, properly speaking, but that all the viscera, as well as other parts of the body, are vascular, and nothing but plexus, or net-work, of small vessels and canals. 3. Viscerous, such as the flesh of the stomach and guts. 4. Glandulous, as that of the tonsils, the pancreas, the breasts, &c. 5. Spurious, so they called the flesh of the lips, gums, the glans of the penis, &c. because it is of a constitution different from all the rest.

The moderns admit only one kind of flesh, *viz.* the muscular. Sometimes, however, they apply the term to the glands, which they call, by way of distinction, glandulous flesh.

The fleshes of young animals abound with a soft and nourishing juice, but that of the older, is more nourishing. The juices of old animals are spirituous, gelatinous, and agreeable to the taste, but the flesh is hard and difficult of digestion. The flesh of wild animals are more light and digestible than that of tame.

Dr. Hales proposes to salt the fleshes put on shipboard, by injecting hydrostatically a strong brine into the blood-vessels of animals, immediately after they are killed.

**FLESH**, among botanists, is all the substance of any fruit that is between the outer rind and the stone; or that part of any root that is fit to be eaten.

**FLESH-COLOUR**. See **CARNATION**.

**FLESHUS**, the **FLOUNDER**, in ichthyology. See the article **FLOUNDER**.

**FLEUR DE LISE**, in heraldry, the same with flory. See the article **FLORY**.

**FLEURY**, a town of Burgundy, in France, thirty miles north of Chalons.

**FLEXIBLE**, in physics, a term applied to bodies capable of being bent or diverted from their natural figure or direction.

Every flexible body, say the schoolmen, is porous, and that in such a manner, as that the pores or chambers may become longer or shorter; and if any corporeal substance fills these pores, it must be conceived so subtle as to be easily expelled by compression, or at least capable of being driven from one chamber to another, according as the body is bent in this or that direction.

**FLEXION**, in anatomy, is applied to the motion by which the arm or any other member of the body is bent. It is also applied to the muscles, nerves, &c.

**FLEXION** or **FLEXURE** of curves. See the article **FLEXURE**.

**FLEXOR**, in anatomy, a name applied to several muscles, which are so called from their office, which is to bend the part to which they belong, in opposition to the extensors, which open or stretch them, as, 1. Flexors of the head, which are the mastoideus, the rectus major anticus, and the rectus minor anticus. 2. Flexors of the neck, *viz.* the scalenus and longus. 3. Flexors of the back and loins, the quadratus lumborum, the psoas parvus, the intertransversales lumborum. 4. Flexors of the cubitus, the brachius externus, and brachius internus. 5. Flexors of the carpus, the radius internus, the ulnaris internus, and the palmaris. 6. Flexors of the first, second, and third phalanx of the fingers, *viz.* the four lumbricales, the sublimis or perforatus, and the perforans or profundus. 7. Flexors of the thigh, called also elevators, the psoas magnus, the iliacus, and the pectinæus, called also lividus. 8. Flexors of the tibia, the gracilis, the semimembranosus, the seminovosus, the biceps, and the popliteus. 9. Flexors of the tarsus or foot, the tibialis anticus, and the peronæus anticus. 10. Flexors of the phalanges of the toes, the lumbricales, the perforatus, the perforans, and the flexor longus of the great toe, whose origin is in the posterior part of the fibula, and its termination in the lower part of the last phalanx, together with the flexor brevis, the origin of which is from the middle os cuneiforme, and its termination at the two sesamoide bones of the great toe, which are joined by ligaments to its first phalanx. See **MASTOIDÆUS**, **RECTUS**, **SCALenus**, **BRACHIÆUS**, &c. &c.

**FLEXURE** of curves, in the higher geometry, is used to signify that a curve is both concave and convex, with respect to a given right-line *Ap*, or a fixed point *P* (plate **XCVIII**. fig. 5. n<sup>o</sup> 1.). Thus the curve *CMD* having the part *CM* concave towards *AP* or *P*, and the part *MD* convex to the same, is said to have a flexure: and the point *M* which limits the concavity and convexity, is called the point of inflection or contrary flexure. See the article **INFLECTION**.

This

This is to be understood when the point, supposed to describe the curve, coming to M, continues its course towards the same side; but if it turn backwards, as in n° 2, 3, 4, *ibid.* the curve may either have a continued curvature, as in n° 4, or have a cuspis point of reflection or of retrogradation, as in n° 2, 3. As to the method of finding the points of contrary flexure, see l'Hospital's Anal. inf. Petit. sect. 4. See also INFLECTION.

**FLIE**, or **FLY**, in zoology, &c. See the article **FLY**.

**FLIE**, in geography, an island at the entrance of the Zuyder-sea.

**FLIGHT**, in general, denotes the act of flying. See the article **FLYING**.

**FLIGHT** in heraldry. See the article **VOL**.

**FLIGHT** of a *stair-case*. See **STAIR-CASE**.

**FLINGING**, in the manege, the same with jerking. See the article **YERK**.

**FLINT**, *sillex*, in natural history, a semi-pellucid stone, composed of crystal debased with earth, of one uniform substance, and free from veins; but of different degrees of colour, according to the quantity of earth it contains, and naturally surrounded with a whitish crust.

Flint is a stone of an extremely fine, compact, and firm texture, and very various, both in size and figure. It is of all the degrees of grey, from nearly quite black, to almost quite white. It breaks with a fine, even, glossy surface; and is moderately transparent, very hard, and capable of a fine polish. It readily strikes fire with steel, and makes not the least effervescence with aquafortis, and burns to a whiteness. Its uses in glass-making, &c. are too well known to need a particular recital.

It is not uncommon to find on our shores fine, pellucid, flinty bodies, streaked or veined with white, black, brown, &c. These are the agates of this country, and answer in every particular, but fineness, to the gem. See the article **AGAT**.

The manner of preparing flints for the nicer operations in the glass-trade, is this: after freeing them from the white crusts with which they are commonly surrounded, calcine them in a strong fire; then powdering them in an iron mortar, sift the powder through a very fine sieve: pour upon this powder some weak aquafortis, to dissolve any particles of iron it may have got from the mortar; then, after standing some time, wash it well with hot water, and dry it for use.

*Oil of FLINTS*, a name given to the liquor obtained from a mixture of four ounces of calcined and powdered flints, with twelve ounces of salt of tartar: this being melted together in a strong fire, runs into glass; which is to be powdered and set in a cellar, where it runs into an oil per deliquium.

**FLINT-CASTLE**, an old town and castle, which gives names to Flintshire, in Wales, is situated on the river Dee, ten miles east of St. Asaph, and sends one member to parliament: west long. 3° 12', north lat. 53° 20'.

**FLIP**, a drink common among sailors, made up of malt-liquor, brandy, and sugar, mixed together.

**FLIX**, a town and castle of Catalonia, in Spain, twenty miles north of Tortosa.

**FLIX-WEED**, a genus of plants called by authors erysimum. See **ERYSIMUM**.

**FLOAT** of a *fishing-line*, the cork or quill that floats or swims above water. See the article **FISHING**.

The quills of muscovy ducks are the best floats for slow waters, but for strong streams, cork-floats are the best; for which purpose take a good sound cork, without flaws or holes, and bore it thro' with a hot iron, into which put a quill of a fit proportion: then pare the cork into a pyramidal form, of what size you please, and then grind it smooth.

**FLOAT** also signifies a certain quantity of timber bound together with rafters, athwart, and put into a river to be conveyed down the stream; and even, sometimes, to carry burdens down a river with the stream.

**FLOAT-BOARDS**, those boards fixed to water-wheels of under-shot mills, serving to receive the impulse of the stream, whereby the wheel is carried round. See the article **WHEEL** and **MILL**.

It is no advantage to have too great a number of float-boards, because, when they are all struck by the water in the best manner that it can be brought to come against them, the sum of all the impulses will be but equal to the impulse made against one float-board at right angles, by all the water coming out of the penstock through the opening, so as to take place on the float-board. The best rule in this case is to have just so many, that each of them may come out of the water as soon as possible, after it has received and acted with its full impulse. As to the length of the float-board, it may

be regulated according to the breadth of the stream. See the article **MILL**.

**FLOATAGES**, all things floating on the top of the sea or any water, a word much used in the commissions of water-bailiffs.

**FLOATINGS**, in husbandry, the drowning or watering of meadows.

**FLOATING of cheese**, among housewives, separating the whey from the curd. See the article **CHEESE**.

**FLOATING-BRIDGE**. See **BRIDGE**.

**FLOATING-ISLANDS**. See **ISLAND**.

**FLOOD**, a deluge or inundation of waters. See the article **DELUGE**.

**FLOOD**, among seamen, is when the tide begins to come up, or the water begins to rise, then they call it young flood; after which it is quarter flood, half flood, and high flood. See the article **TIDE**.

**FLOOD-MARK**, the mark which the sea makes on the shore, at flowing water, and the highest tide: it is also called high water mark.

**FLOOK**, or **FLUKE**, of an anchor. See the article **ANCHOR**.

**FLOOKING**, among miners, a term used to express a peculiarity in the load of a mine. The load or quantity of ore is frequently intercepted in its course, by the crossing of a vein of earth or stone, or some different metallic substance; in which case the load is moved to one side, and this transient part of the land is called a *flook*ing.

**FLOOR**, in architecture, the under side of a room, or that part we walk on.

Floors are of several sorts, some of earth, some of brick, some of stone, and some of wood.

Earthen floors are commonly made of loam, and sometimes, when they are designed to make malt on, of lime and brook-sand, and gun-duff, or anvil-duff, from the forge.

The manner of making these floors for plain country habitations, is as follows. Take two thirds, of lime, and one of coal-ashes well sifted, with a small quantity of loamy clay; mix the whole together, and temper it well with water, making it up into a heap: let it lie a week or ten days: then temper it well over again. After which heap it up for three or four days, and repeat the tempering very high, till it become smooth, yielding, tough and glewy. Then the ground being levelled, lay your floor therewith, about two and a half or three inches thick, making it smooth with a trowel: the hotter the season is the bet-

ter; and when it is thoroughly dried, it will make the best floor for houses, especially for malt-houses.

If any would choose to have their floors look better, let them take lime made of rag-stones, well tempered with whites of eggs, covering the floor about a quarter or half an inch thick with it, before the under flooring be too dry. If this is well done, and thoroughly dried, it will look, when rubbed with a little oil, as transparent as metal or glass.

For brick and stone floors, see the article **PAVING**.

Carpenters, by the word floor, understand as well the framed work of timber, as the boarding over it.

Concerning boarded floors, it is to be observed, that the carpenters never floor rooms with boards, till the carcase of the house is set up, and also is inclosed with walls, lest the weather should wrong the flooring; yet they generally rough-plane the boards for flooring, before they begin any thing else about the building, that they may let them by to season; which is done by laying them flat upon three or four balks, each board about the breadth of a board a funder, the whole length of the balks: then, by laying another lay of boards athwart the last, and so on till they have laid them all in this manner, by which means they lie hollow for the air to play between them.

The best way of placing the principal timbers in a floor, is not to lay them over doors or windows, nor too near chimnies: the boards should all lie one way, which is generally the way that you have the best visto.

**FLOOR of a ship**, is so much of her bottom as she rests upon, when she rests on the ground. See the article **SHIP**.

Such ships as have long, and withal broad floors, lie on the ground with most security; and those that are narrow in the floor, cannot be grounded without danger either of being overfret, or at least of hurting their sides.

**FLORAL**, in general, something belonging to a flower. See **FLOWER**.

Thus floral leaves are those found only near flowers.

**FLORAL GAMES**, in roman antiquity, annual games instituted in honour of the goddess Flora, which began to be celebrated on the fourth of the calends of May, or April 28, and were continued to the calends, or first of May.

The *floralia*, or floral games, were celebrated

brated in the Campus Martius, being first proclaimed by sound of trumpet; and during the celebration, the ædiles scattered all manner of pulse among the people. It is also said, that during the floralia, harlots danced naked, playing a thousand lascivious tricks. They were first instituted in the 513th year of Rome.

**FLORENCE**, an archbishop's see and city of Italy, situated on the river Arno, in Tuscany, forty-five miles east of Leghorn: east lon.  $12^{\circ} 15'$ , and north lat.  $43^{\circ} 30'$ . Florence is one of the most elegant towns in Italy, has an university, and is six miles in circumference. The statues, paintings, and curiosities in the grand duke's palace are the admiration of travellers.

**FLORENTINE**, a town of Champaign in France, twenty-eight miles south-west of Troyes.

**FLORES, FLOWERS.** See the articles **FLOWER** and **FLOS**.

**FLORES**, in geography, one of the Azores-islands, subject to Portugal.

**FLORID STYLE**, is that too much enriched with figures and flowers of rhetoric.

Longinus uses the terms *florid* and *affected style* indifferently, and lays them down as quite contrary to the true sublime. See the article **STYLE**.

**FLORIDA**, in geography, a name first given by the Spaniards to all that part of north America which lies north of the gulph of Mexico. However, all that retains the name Florida, at present, is the peninsula between the british colony of Georgia and cape Florida, viz. between  $25^{\circ}$  and  $30^{\circ}$  of north latitude, and between  $81^{\circ}$  and  $85^{\circ}$  west longitude.

**FLORILEGE**, *florilegium*, a name the Latins have given to what the Greeks call *anthologion*, anthology. See the article **ANTHOLOGION**.

**FLORIN**, is sometimes used for a coin, and sometimes for a money of account. Florin as a coin, is of different values, according to the different metals and different countries where it is struck. The gold florins are most of them of a very coarse alloy, some of them not exceeding thirteen or fourteen carrats, and none of them seventeen and a half. As to silver florins, those of Holland are worth about 1s. 8d. those of Genoa were worth  $8\frac{1}{4}$ d. sterling.

Florin, as a money of account, is used by the Italian, Dutch, and German merchants and bankers, but admits of dif-

ferent divisions in different places: in Holland it is on the footing of the coin of that name, containing 20 stivers. At Frankfort and Nuremberg it is equivalent to 3s. sterling, and is divided into creutzers, and pfennings. At Liege it is equivalent to 2s. 3d. At Strasbourg, to 1s. 8d. In Savoy, to 11d. At Genoa, to  $8\frac{1}{4}$ d. And at Geneva, to  $6\frac{1}{2}$ d. See the article **COIN**.

**FLORINIANS**, *floriniani*, in church-history, a sect of heretics, of the 11d century, so denominated from their leader Florinus, who made God the author of evil.

They are a species of the gnostics, but deny the judgment and resurrection, and hold that our Saviour was not born of a virgin. They were also called borborites. See the article **BORBORITES**.

**FLORIST**, *florista*, according to Linnæus, is an author, or botanist, who writes a treatise called Flora, comprehending only the plants and trees to be found growing naturally in any place. However, in the more common acceptation of the word, florist signifies a person well skilled in flowers, their kinds and cultivation. See the article **FLOWER**.

**FLORUS**, in ornithology, a bird otherwise called whinchat. See **WHINCHAT**.

**FLORY, FLOWRY, or FLEURY**, in heraldry, a cross that has the flowers at the end circumflex and turning down, differing from the potence, inasmuch as the latter stretches out more like that which is called patee. See the article **POTENCE** and **PATEE**.

The cross flory is represented in plate **XCVIII.** fig. 2.

**FLOS, FLOWER**, in botany. See the article **FLOWER**.

**FLOS**, in chemistry, the most subtle part of bodies separated from the more gross parts by sublimation, in a dry form. 1. *Flores benzoini*, flowers of benjamin, are prepared in the following manner: put powdered benjamin into an earthen pot, placed in sand, and with a small heat the flowers will rise, and may be caught by a paper-cone placed over the pot. See the article **BENZOIN**. 2. *Flores sulphuris*, flowers of sulphur: let sulphur be sublimed in a fit vessel; and any part of the flowers which may have concentered are to be reduced to powder by a wooden mill, or in a marble mortar with a wooden pestle. They are used in diseases of the breast, and likewise in cutaneous distempers, both internally and externally. 3. *Flores sulphuris*

*phuris loti*, flowers of sulphur washed : pour water on the flowers, to the height of three or four fingers above them, and boil them for a time ; then pour off this water, and with fresh cold water wash the remains of this away ; then dry the flowers for use. 4. *Flores martiales*, martial flowers : take of washed colcothar of green vitriol, or of iron-filings, one pound ; of sal ammoniac, two pounds : mix and sublime them in a retort ; and mixing again the bottom with the flowers, renew the sublimation till the flowers acquire a beautiful yellow colour : to the residue may be added half a pound of fresh sal ammoniac, and the sublimation repeated ; and the same process may be continued, as long as the flowers rise duly coloured. They are reckoned very attenuating and aperient, and therefore are prescribed in many obstructions, and in asthma. 5. *Flores bismuthi*, flowers of bismuth, are used as a fucus, being mixed with pomatum or rose-water, &c.

**FLOSCULOUS**, among botanists, an appellation given to compound flowers, made up of a number of lesser ones, all inclosed in the same common cup.

The plants with flosculous flowers make one of Tournefort's classes, called by Linnæus *syngenesia*. See the articles **BOTANY** and **SYNGENESIA**.

**FLOTA**, or **FLOTTA**, **FLEET**, a name which the Spaniards give particularly to the ships that are annually sent from Cadiz to the port of Vera Cruz, to fetch thence the merchandizes gathered in Mexico for Spain. This fleet consists of the captains, admiral, and patach or pin-nace, which goes on the king's account ; and about sixteen ships, from four hundred to a thousand tons, belonging to particular persons. They set out from Cadiz about the month of August, and make it about eighteen or twenty months before they return.

**FLOTILLA**, a name given to a number of ships which get before the rest in their return, and give information of the departure and cargo of the flota and galleons. See the preceding article.

**FLOTSON**, or **FLOTSOM**, goods that by shipwreck are lost, and floating upon the sea ; which, with jettson and lagan, are generally given to the lord admiral : but this is the case only where the owners of such goods are not known. And here it is to be observed, that jettson signifies any thing that is cast out of a ship when in

danger, and afterwards is beat on the shore by the water, notwithstanding which the ship perishes. Lagan is where heavy goods are thrown overboard, before the wreck of the ship, and sink to the bottom of the sea.

**FLOUNDER**, the english name of a well-known fish, called by ichthyologists the pleuronectes with the eyes on the right side, the lateral or side lines rough, and small spines at the fins. See the article **PLEURONECTES**.

The flounder is a well tasted fish, known in some parts of the kingdom by the names fluke and bul.

**FLOUR**, the meal of wheat-corn, finely ground and sifted. See **MEAL**.

The grain itself is not only subject to be eaten by insects in that state, but when ground into flour it gives birth to another race of destroyers, who eat it unmercifully, and increase so fast in it, that it is not long before they wholly destroy the substance. The finest flour is most liable to breed these, especially when stale, or ill prepared. In this case, if it be examined in a good light, it will be perceived to be in a continual motion ; and on a nicer inspection, there will be found in it a great number of little animals, of the colour of the flour, and very nimble. If a little of this flour be laid on the plate of the double microscope, the insects are very distinctly seen in great numbers, very brisk and lively, continually crawling over one another's backs, and playing a thousand antic tricks together, whether for diversion, or in search of food, is not easily determined. These animals are of an oblong and slender form ; their heads are furnished with a kind of trunk, or hollow tube, by means of which they take in their food, and their body is composed of several rings. They do vast mischief among the magazines of flour laid up for armies, and other public uses : when they have once taken possession of a parcel of this valuable commodity, it is impossible to drive them out ; and they increase so fast, that the only method of preventing the total loss of the parcel, is to make it up into bread as soon as can be done. The way to prevent their breeding in the flour, is to preserve it from damp : nothing gets more injury by being put up in damp, than flour ; and yet nothing is more frequently put up so. It should be always carefully and thoroughly dried, before it is put up ; and the barrels also dried into which it is to be

put; then, if they are kept in a room tolerably warm and dry, they will keep it well. Too dry a place never does flour any hurt, though one too moist always spoils it.

**FLOUR**, in geography, a city of the Lyonsois, in France, -forty-five miles south of Clermont.

**FLOWER**, *flor*, among botanists and gardeners, the most beautiful part of trees and plants, containing the organs or parts of fructification. See the article **FRUCTIFICATION**.

The parts of a flower are the ovary or pistil, the corolla or flower-petals, the stamina or chives, the empalement or calyx, the perianthium, pericarpium, and fruit. See the articles **PISTIL**, **COROLLA**, **STAMINA**, &c.

According to the number of petals, or flower-leaves, flowers are called monopetalous or one-leaved, dipetalous or two-leaved, tripetalous or three leaved, &c. Flowers are again distinguished into male, female, and hermaphrodite: the male flowers are those containing stamina, without any pistil or fruit, commonly called stameneous flowers. The female flowers are such as contain the pistil, which is succeeded with fruit; these are called fruitful or knitting flowers. The hermaphrodites are those which contain the organs of both sexes, *viz.* stamina and pistils; and these are by far the most numerous. From the different figures and disposition of the flower-leaves of plants, Mr. Tournefort has established a system of botany; whereas that of Linnæus is chiefly founded on the number and disposition of the stamina. See **BOTANY**.

Flowers were in great request among the antients: they adorned their temples, houses, and even tombs with them; but their principal use seems to have been at entertainments, where the guests were always decked with flowers, and even the room strewed with them.

Quincy tells us, that flowers, designed for medicinal use, should be plucked when they are moderately blown, and on a clear day before noon: and that for conserves, roses must be taken in the bud.

For the method of preserving specimens of flowers, see the article **HORTUS SICCUS**.

**FLOWER of Bristol**, a plant more usually called lychnis. See **LYCHNIS**.

**Gentle FLOWER**, the same with amaranth. See the article **AMARANTH**.

**Eternal FLOWER**, the english name of the xeranthemum. See **XERANTHEMUM**.

**Everlasting FLOWER**, the english name of the gnaphalium. See **GNAPHALIUM**.

**FLOWER-FENCE**, the english name of the poinciana. See **POINCIANA**.

**FLOWER DE LUCE**, the same with the iris. See the article **IRIS**.

**Sultan-FLOWER**, the same with the cyanus. See the article **CYANUS**.

**Sun-FLOWER**, the english name of the helianthus. See **HELIANTHUS**.

**Trumpet-FLOWER**, the same with the bignonia. See the article **BIGNONIA**.

**Wind-FLOWER**, the same with the anemone. See the article **ANEMONE**.

**FLOWERS**, in chemistry. See the article **FLOS**, *supra*.

**FLOWER DE LIS**, or **FLOWER DE LUCE**, in heraldry, a bearing representing the lily, called the queen of flowers, and the true hieroglyphic of royal majesty; but of late it is become more common, being borne in some coats one, in others three, in others five, and in some semee, or spread all over the escutcheon in great numbers.

The arms of France are, three flower de lis or, in a field azure.

**FLOWN-SHEETS**, in the sea-language. A ship is said to sail with flown sheets, when her sails are not haled home, or close to the blocks. *The sheets are flown*, that is, they are let loose, or run as far as they will.

**FLOX**, among dyers, signifies well cleaned wool, used to absorb the colours of cochineal.

**FLUDDER**, or **FLUDER**, a large bird of the colymbus or diver-kind, nearly allied to the lumme. See **COLYMBUS** and **LUMME**.

**FLUELLIN**, the english name of a plant called by botanists elatine. See the article **ELATINE**.

**FLUENT**, in fluxions, the flowing quantity, or that which is continually either increasing, or decreasing, whether line, surface, solid, &c. See **FLUXION**.

It is easy to find the fluxions, where the fluents are given; but, on the contrary, it is very difficult to find the fluents of given fluxions.

**FLUID**, in physiology, an appellation given to all bodies whose particles easily yield to the least partial pressure, or force impressed.

Some philosophers make the following distinction in fluids; those which flow or spread

spread themselves till their surfaces become level or horizontal, they call liquid; in contradistinction to flame, smoke, vapour, &c. which are also fluids, but do not acquire such a surface. Those which are capable of exciting in us the idea of moistness, as water, &c. they call humid, distinguishing them thereby from air, quicksilver, and melted metals. But these distinctions are quite unnecessary in a philosophical sense; the surfaces of all fluids being level, or horizontal, when not prevented by the bodies about them: and humidity is only a relative quality; for though quicksilver will not moisten or stick to a man's finger, it will to silver or gold. See **FLAME**, **SMOKE**, **LIQUID**, &c.

The nature of a fluid, as distinguished from that of a solid, or hard body, consists in this, that its particles are so loosely connected together, that they readily move out of their places, when pressed with the least force one way more than another. From whence philosophers conclude, that these particles are exceedingly minute, smooth, and round, it being otherwise impossible they should move with such freedom upon the least inequality of pressure.

Those particles considered separately, are endued with all the common properties of matter, and are subject to the same laws of motion and gravitation with larger bodies. To enquire, therefore, into the nature of fluids, is to consider what appearances a collection of very small round bodies, subject to these laws, will exhibit under different circumstances.

**Laws and properties of FLUIDS.** 1. All fluids are incompressible, except air; or, they cannot, by any force, be compressed into a less space than what they naturally possess, as is proved by the florentine experiment, of filling a globe of gold with water, which, when pressed with great force, causes the water to transude or issue through the pores of the gold, in form of a dew all over its surface. See **AIR**. 2. All fluids gravitate, or weigh in proportion to their quantity of matter, and that not only in the air, but in *proprio loco*: or, a fluid weighs the same, communicating with a quantity of that fluid, as in *vacuo*; which all philosophers, till very lately, have denied.

The reason was this; because philosophers found that a bucket of water, in water, weighed nothing; that is, that because there was no relative gravity in water, they

very strangely infer'd there was no absolute gravity in any part or particle of water, whilst it remained in water, but only became heavy when taken out or separated from the rest. But their mistake is easily evinced by the following experiment: let a bottle, or phial, with shot in it, to make it sink in water when close stopped, be hung at the end of a nice balance, and then immersed into a jar of water: while thus hanging in water, let it be counterpoised very exactly by weights put into the scale at the other end; then, pulling out the cork, the water will rush into the bottle, and destroy the equilibrium, by causing the balance to descend; which will be a plain proof that water has weight in water.

That fluids gravitate, or are heavy, in the same manner with solids, is evident; because the earth's attraction, which is the center of gravity, equally affects the particles of all sorts of matter, and therefore excites the same endeavour, or tendency towards the center of the earth, in the particles of a fluid, as in those of a solid body: and this is what we call absolute gravity. See **GRAVITY**.

Now since in fluids of the same kind as water, all the particles are reasonably supposed equal and alike in all circumstances, they will be all equally affected by attraction, and therefore have, among themselves, an equal tendency towards the earth's center; whence, since they gravitate equally, if they are equally obstructed in their descent (as by the bottoms of the vessels, &c.) they will all retain the same position among themselves, as if they were affected by no power at all; and thus they are said to be relatively at rest, or in a state of quietus among themselves; since no one particle of the same fluid has a greater share of attracting power than another, no one will tend to descend before another; and therefore, among the particles of the same fluid, there is no such thing as what we call relative or residual gravity, which is nothing but the excess of gravity, by which one body tends downwards more than another.

3. From the gravity of fluids arise their pressure, which is always proportional thereto: and since we may suppose all the particles of a fluid to have equal bulk and weight, the gravity of the fluid, and consequently the pressure will be always proportional to the altitude or depth thereof: whence the weight and pressure of fluids on the bottoms of vessels, &c. must be equal,

4. The pressure of fluids upwards is equal to the pressure downwards, at any given depth. To illustrate this and the foregoing proposition, let ABCD (pl. C. fig. 1.) be a vessel of water, whose altitude EF suppose to consist of a column of 10 aqueous particles; then, it is evident, the first or uppermost particle 1 can affect the next particle 2, only by its weight and pressure, which therefore is as 1; and since that particle 2 is immovable, and action and re-action equal and contrary, the said particle 2 will re-act upwards upon the particle 1, with a force which is as 1. In the same manner the particle 2 acts on the particle 3, by pressure downwards, with two degrees of force, arising from its own weight and from that of the particle above it; and accordingly it is pressed upwards with an equal force by the re-action of the particle 3. And so of all the rest, wherefore the propositions are manifest.

5. The pressure is upon all particles of the fluid, at the same depth, equal in every part; or the particles of a fluid, at the same depth, press each other, every way and in all directions, equally. For if any particle were pressed more on one part than another, it must give way and yield, till the pressure become every way equal; otherwise an incessant intestine motion of the particles must ensue, which is absurd, and contrary to experience.

6. From the mutual pressure and equal action of the particles, it follows, that the surface of a fluid must be perfectly smooth and even; for should any part stand higher than the rest, by any force, as attraction, &c. it would immediately subside to a level with the other part, by the force of its own gravity, when that force is removed.

7. The figure of the surface of all fluids is spherical or convex; for all the particles equally gravitating towards the center of the earth, will take their places from it at equal distances at the surface, and so form a part of the superficies of a sphere, equal to the bulk of the earth. Besides the reason of the thing, we know from experiment, that the surface of large waters, as those of the sea or ocean, is convex; for a person standing on the shore, and viewing a ship under sail, directly before him, will lose sight thereof by degrees, the hull or body of the ship first disappearing, then the lower parts of the mast, then the top of the lower masts, and lastly the top of the tallest mast.

This is more fully explained in determining the figure of the earth. See the article EARTH.

8. Since fluids press equally every way, the pressure of each particle against the side of a vessel will be proportional to its altitude, and consequently the pressures of the particles 1, 2, 3, 4, &c. of a perpendicular column against the side BC (ib. fig. 1.) will be a series of numbers in arithmetical progression, whose first term is 0; therefore the sum of all the pressures is equal to the number of pressures multiplied by half the greatest pressure: but the number of pressures is as the number of particles, or altitude of the fluid BC; also the greatest pressure is as the same altitude; wherefore the total pressure against the side of a vessel, is as the square of the altitude of the fluid. See the article PROGRESSION.

This way of considering the quantity of lateral pressure, by the arithmetical series, is universal; whereas the common method restrains it to the property of an equicrural right-angled triangle, and to a vessel of a cubical form, which we shall here give, for the sake of proving it several ways: suppose ABCD (ib. fig. 1.) a vessel of a cubical form, that is, whose side BC is equal to the length of the bottom CD. If the diagonal BD be drawn, we shall have the lines  $1a = B1$ ,  $2b = B2$ ,  $3c = B3$ ,  $4d = B4$ , &c. but B1, B2, B3, B4, &c. being as the altitudes of the fluid, will represent the lateral pressures in the points 1, 2, 3, 4, &c. therefore also the lines  $a1$ ,  $b2$ ,  $c3$ ,  $d4$ , &c. will represent the same lateral pressures; hence when the distances B1, B2, B3, &c. are indefinitely small, the lines  $a1$ ,  $b2$ ,  $c3$ ,  $d4$ , &c. will be indefinitely near each other; and so all those lines drawn in the triangle BCD, will make the area of that triangle: therefore the sum of all the lateral pressure against the side BC, will be as the area of that triangle. But the area of the triangle BCD is as the square of the side BC; consequently the sum of all the lateral pressures is as the square of the altitude of the fluid BC.

9. Hence, if the vessel AC (ib. fig. 1.) be of a cubical form, the pressure against a side BC, is half that upon the bottom CD, and consequently the total pressure against the sides and bottom is equal to three times the weight of the fluid on the bottom of such a vessel.

10. The weight, pressure, or effect of a fluid, upon the bottom DE (ib. fig. 2.)

of



## FLUIDS.

Fig. 3.

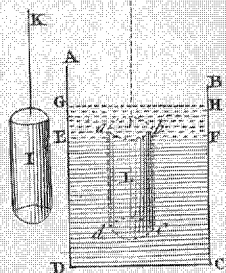
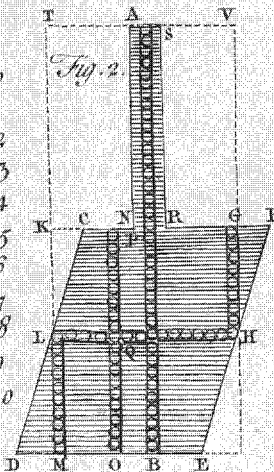
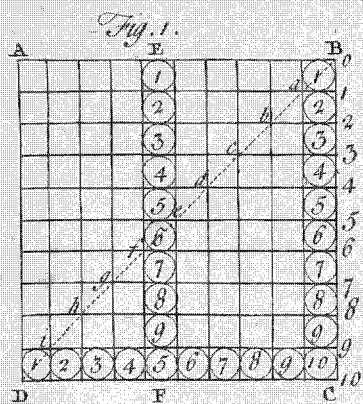


Fig. 5.



Fig. 4.

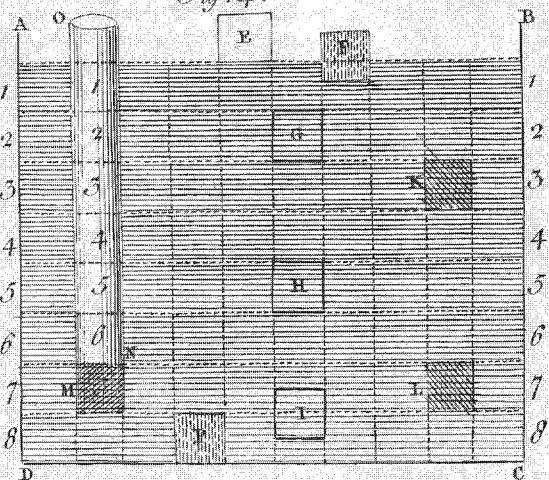


Fig. 6.

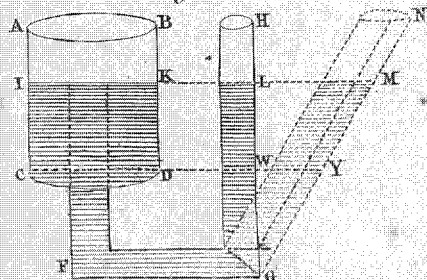
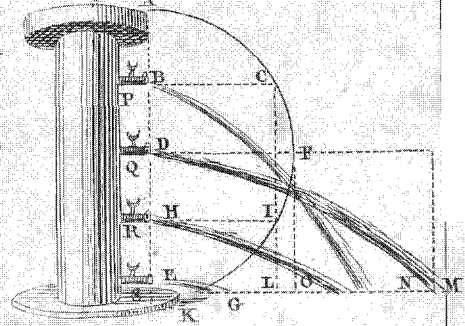


Fig. 7.





of any vessel *ACDEF*, is proportional to the altitude *AE* only, and not to the quantity of the fluid in the vessel. For every column of particles *GH*, which presses downwards on the side of the vessel *EF*, has its force destroyed by the equal re-action of the subjacent particle *H* in the side, and so cannot at all affect the bottom of the vessel. Again, the pressure of any column of particles *LM* upwards, against the side of any vessel *CD*, is equally re-acted by the particle of the vessel over it, and so its force or pressure on the bottom must be the same as that of another column of particles *AB* of equal altitude with the fluid : whence the proposition is evident.

11. Hence a very small quantity of fluid *APRS* (*ib. 2.*) may be made to counter-balance, or be equivalent to the weight or force of any given quantity *T KGV*, how great soever.

12. When any body is immersed in a fluid, it loses just so much of its weight as is equal to the weight of an equal bulk of the fluid ; but the weight lost by the body is gained by the fluid, which will be so much heavier than before.

This is the fundamental principle of every hydrostatic process, particularly of the whole doctrine of specific gravities, which therefore cannot be made too plain and easy to be understood.

To this end, let *ABCD*, (*fig. 3.*) be a vessel filled with water, to the height *EF* ; and let *I* be a cylindric body, heavier than water, to be immersed therein, as at *L*. By this immersion of the body *I*, a quantity of the fluid *abcd*, equal in bulk to the body, will be displaced by the superior force, or greater gravity of the solid ; and this quantity of fluid must ascend, as being confined towards the bottom and sides ; and so rise the surface of the liquor from *EF* to *GH*, and then will the quantity *EFGH* be equal to the bulk of the immersed solid *abcd*. But as the solid comes to enter the fluid, each particle of the fluid, by its vis inertiz, will resist the solid, or endeavour to oppose its descent with all its power ; and so the whole body of the fluid, that is removed or displaced by the solid, will resist it by the united force of all the particles : but this force is equal to the gravity of the fluid removed, as is evident from hence, that the fluid so removed is obliged to ascend or move in a direction quite contrary to gravity, wherefore the solid in its descent will be

resisted by a force equal to the gravity of an equal bulk of the fluid.

And, since the force which resists the descent of solids is proportioned to their bulk only, it follows, that equal bodies immersed in fluids, lose equal parts of their weights ; and therefore, a lighter body loses more of its absolute weight than a heavier one of the same bulk ; and consequently if two bodies of unequal bulk are in equilibrio in the air, that equilibrium will be destroyed on their being immersed in the fluid, because that which has the largest bulk will lose most weight in the fluid.

Again, it is plain, the weight of the fluid is augmented in the same proportion as that of the immersed solid is diminished ; for the force or action of the fluid, on the bottom of the vessel *CD*, is before immersion to that afterwards, as the altitudes *CF* to *CH* ; or to the bulks of the fluid *EFCD* and *GHCD*. And since those bulks act only by their gravity, 'tis plain the action of the fluid is increased only by the additional gravity of the quantity *GHFE*, which is equal to that which the solid loses by immersion. See the article *GRAVITY*.

13. If any body, *E* (*fig. 4.*) could be found without weight, it would, if placed on the surface *AB*, float thereon, without any part immersed ; for being devoid of gravity, it could have no force to displace any particles of the fluid, and sink therein.

14. If an heavy body, *F*, (*n<sup>o</sup> 4.*) lighter than an equal bulk of the fluid, be placed on its surface, it will sink, or descend therein, till it has removed or displaced so much of the fluid whose weight is equal to that of the body. For then the pressure upwards and downwards on the surface of the body is equal, and consequently the body will be there quiescent, or in equilibrio with the fluid. Hence the whole solid is to the immersed part as the specific gravity of the fluid is to that of the solid. See the article *HYDROSTATIC BALANCE*.

This case is not strictly true, but in vacuo ; for in the air such a body may be considered as sustained by two mediums, *viz.* air and water, in one of which, it will sink, or descend ; and in the other, rise.

15. If a solid, as *G*, (*n<sup>o</sup> 4.*) equal in weight to an equal bulk of the fluid, be immersed therein, it will take any situation indifferently in any part of the fluid,

fluid, as at G, H, I, without any tendency to ascend or descend therein; for being totally immersed, it must remove a parcel of the fluid of equal bulk and weight, and consequently the pressure upwards is equal to the tendency downwards, on the lower surface, every where; and therefore it can have no power to sink. Also the pressure downwards must be equal to the pressure upwards, on the upper surface whence it can have no tendency to rise or swim: it will therefore remain at rest in any position G, H, I, wheresoever in the fluid.

16. Lastly, if a body K, or L, (fig. 4.) heavier than an equal bulk of the fluid, be immersed therein, it will descend by the excess of its gravity above that of the fluid; for when immersed, it will be resisted by the force of an equal bulk of the fluid, which therefore will destroy so much of the gravity of the solid; and consequently the residue, or excess of gravity in the solid, is that alone by which it must descend.

The relative gravity of solids, by which they sink or swim, is usually illustrated by the descent and ascent of glass images, and bubbles included in a jar of water, covered over with a bladder, so as to include a small quantity of air between the bladder and water: the images, &c. have small holes in the bottom of their feet thro' which some water is put into their bodies, and that in such quantities as will render them but very little specifically lighter than water; but some more so than others, that they may not begin to move altogether. See the representation in (fig. 5.) The images being thus put to float in water, and the bladder tied down, if the hand be laid on the bladder, and gently compresses the air beneath, the air, by its spring, will act upon the water, and cause it to compress the air in the bodies of the images, by which means more water will be driven into their bodies; and when so much is got in as will make them specifically heavier than the water, then they will begin to descend one after another; and by varying the degree of pressure, you may keep them suspended in any part of the fluid as you please.

From what has been premised of the nature of fluids, it will be easy to understand, that the lightest body, P, (plate *ibid.* fig. 4.) may be depressed in the heaviest fluid by any contrivance to keep the said fluid from pressing on the under

surface of the light body, by which means only light bodies are made to swim. Thus cork, or wood, will abide at the bottom of a vessel filled with quicksilver.

Again: on the other hand, the heaviest body M may be made to swim in the lightest fluid, by keeping the said fluid from pressing on its upper surface, by means of the tube NO. For when by this means it is immersed so deep as to keep off an equal weight of the fluid, the pressure then of the fluid acting upon its under surface upwards, will be equal to the weight of the solid tending downwards; and therefore, if the solid be sunk ever so little deeper, it must swim by the superior force or pressure of the fluid upwards.

Thus, for instance, if the body M be five times heavier than water of an equal bulk, and if by means of the tube NO, placed on its upper surface, the water be kept from pressing thereon, that it be immersed to seven times its thickness below the surface of the water, 'tis plain the pressure on the under surface will be as seven, but downwards only as five; and therefore, since there is the excess of two degrees of pressure upwards, 'tis plain the body cannot descend; but may very properly be said to swim on the water. Hence also the reason of trying the different gravity, density, or strength of divers fluids, or spirituous liquors, by the hydrometer, or water-poise. See the article *HYDROMETER*.

*Motion of FLUIDS.* The motion of fluids, viz. their descent or rise below or above the common surface or level of the source or fountain, is caused either, 1. by the natural gravity or pressure of the fluid contained in the reservoir, or fountain; or, 2. by the pressure or weight of the air on the surface of the fluid in the reservoir, when it is at the same time either taken off or diminished on some part in aqueducts, or pipes of conduit. 3. By the spring, or elastic power of compressed or condensed air, as in the common water engine. 4. By the force of pistons, as in all kinds of forcing pumps, &c. 5. By the power of attraction, as in the case of tides, &c.

1. The most natural motion of fluids is that arising from the force of their own gravity, by which those parts which stand highest press upon others below them, till by that means they rise to the same horizontal level. Thus water in a fountain

tain ABCD (fig. 6.) by its pressure, raises that in the aqueduct FGH to the same height IKLM in every direction or position of the duct GH, or GN; unless the orifice of the said duct be below that level, in which case the water will continually flow from the same. The reason hereof is evident from the principles already laid down, *viz.* that the pressure of fluids was in proportion to the altitude only, and not according to the quantity thereof, and therefore the effect or rise of the fluid in the duct must be equal thereto.

Hence we have conduits often supplied with water from springs, which lie above them; and cocks to supply the inhabitants of a town with water by pipes from a reservoir, in a situation above the highest part of the town: hence also the descent of water in rivers, streams, and canals from springs and sources above the common surface of the earth; and the breaking out of springs at the bottoms and on the side of hills; from cisterns and reservoirs in the internal parts above them, which receive their water from rain, dew, condensed vapour, melted snow, &c. distilling, or percolated through the pores or crevices and chasms of the upper part of the earth. See the articles FOUNTAIN, SYPHON, CONDUIT, TANTALUS'S CUP, JET D'EAU, RESERVOIRS, CANAL, SPRING, CISTERN, &c.

2. The second cause of the rise or motion of fluids is the pressure of the air on the surface of that in the fountain or reservoir: thus if a syphon or crane be immersed with the shorter leg in water, and the air sucked out of the instrument, the fluid will ascend into the vacuous space by the pressure of the air on the water, and fill the whole cavity of the tube; and because there is a greater column of water in the longest leg, it will preponderate and descend thro' it, and will keep flowing out till the vessel is exhausted to the orifice of the shorter leg. The effect of the common pump is from the same principle. See the article PUMP.

3. The third cause of the rise and motion of fluids is by the spring or elastic power of condensed air, upon which principle water engines are contrived. See the article ENGINE.

4. The fourth cause is the force or pressure of pistons, upon which principle a variety of water engines are constructed,

as may be seen under the articles already referred to.

5. The last cause of the motion of fluids which we mentioned was that of attraction. We have elsewhere shewn how by this means any fluid will ascend above the common surface in capillary tubes, &c. See the article CAPILLARY.

But the most notable and obvious motion of fluids arising from attraction, is that of the tides; the waters of the immense ocean forgetful, as it were, of their natural quietus, move and roll in swelling tides obsequious to the sovereign power of the moon, and weaker influence of the sun. See the article TIDES.

*Momenta and velocities of FLUIDS.* The momenta of fluids, as well as of solids, is compounded of the quantity of matter and velocity; but in spouting fluids, the quantity of the fluid issuing thro' the same hole, in the same time, is always as the celerity of its motion, as is easy to conceive. Whence the momenta of spouting fluids, are proportional to the squares of the velocities, or quantities of matter issuing out in a given time. But since the momenta are the effect of pressure, it is evident the velocity or quantity of spouting fluids is ever proportional to the square root of the pressure, or altitude of the fluid. From hence it appears, that the velocity of a fluid spouting at any depth below the surface is equal to the velocity a heavy body would acquire by falling from the same height; because the velocity, as was observed, is always as the square root of the space descended through. If therefore on the altitude of the fluid AK, (fig. 7.) as a diameter, we describe the semicircle AFK, and from any point therein, as I, we draw the perpendicular IH, that shall be proportional to the distance to which the fluid will spout from an adjutage at H: for the velocity will be, as the square root of AH; and the time, as the square root of HK; whence the product of these two will express both the space passed over by the projected body, and also the line HI. Hence it follows, that a fluid will spout from a hole or adjutage D, in the center of the semicircle, or middle part of the altitude AK, to the greatest horizontal distance KM possible; because the perpendicular FD is the greatest that can be drawn to the diameter AK. Also it is evident, that from two holes B and H, equally distant above and below the middle altitude D, the jets of water will

be made to the same horizontal distance  $KN$ ; because the perpendiculars to these two points, *viz.*  $CB$  and  $IH$ , are equal. Moreover, the horizontal distance  $KM$ , to which the water spouts from  $D$  the center, is equal to the diameter or altitude  $AK$ , or twice  $DF$ . For since the velocity of the jet at  $Q$  is equal to that acquired by falling through the height  $AD$ , or  $DK$ , it will, as being uniform, carry the fluid in an horizontal direction over twice the space  $DK$  or  $DF$  in the same time. And therefore, since the distances of jets from  $D$  and  $B$  are as  $DF$  to  $BC$ , and the distance of the jet from  $D$  is equal to twice  $DF$ , the distance of the jet from  $B$  will be also equal to twice  $BC$ , or  $KN = 2 BC$ . From what has been said, it is easy to observe, that the motion of a spouting fluid is every way similar to that of a projected solid. The path of the fluid is a parabola, because it is impelled by two forces, one horizontal, the other of gravity in the perpendicular, in the same manner as in the projected solid. See **PROJECTILE**.

The impetus of the jets  $B$ ,  $D$ ,  $H$ ,  $E$ , is as the height of the reservoir  $AB$ ,  $AD$ ,  $AH$ ,  $AE$ ; the greatest horizontal random  $KM$ , is that from the jet  $D$ , directed to the middle point  $F$  of the semi-circle; and any two jets equally distant as  $B$ ,  $H$ , go to the same distance  $KN$  on the horizon. If the adjutage be horizontal, the jet will be a semiparabola; if oblique, it will be a whole parabola. See the article **PARABOLA**.

**FLUKE**, in ichthyology. See **FLOUNDER**.

**FLUKE of an anchor**. See **ANCHOR**.

**FLUMMERY**, a wholesome sort of jelly made of oat-meal.

The manner of preparing it is as follows. Put three large handfuls of finely ground oat-meal to steep, for twenty-four hours, in two quarts of fair water: then pour off the clear water, and put two quarts of fresh water to it: strain it through a fine hair sieve, putting in two spoonfuls of orange flower-water, and a spoonful of sugar: boil it till it is as thick as a hasty pudding, stirring it continually while it is boiling, that it may be very smooth.

**FLUOR**, in physics, a fluid, or more properly, the state of a body that was before hard or solid, but is now reduced by fusion, or fire, into a state of fluidity.

**FLUOR**, in mineralogy, implies a sort of mineral concretion, frequently found amongst ores and stones, in mines and quarries.

**FLUOR ALBUS**, or **WHITES**, in medicines an efflux of a whitish, lymphatic, serous, or aqueous humour, from the matrix. It is sometimes white, sometimes pale, yellow, green, or blackish. Sometimes it is sharp and corrosive, sometimes foul and fetid; the face is discoloured, there is a pain in the spine of the back, the appetite is lost, and the eyes and feet swell. Some women have a periodical flux of the whites, instead of the menses. There are remarkable distinctions in this disorder, as the lacteous, the semi-lacteous, and lymphatic: it may be so acrid or caustic, as to excoriate the vulva. Besides the symptoms already mentioned, it is attended with a swelling of the uterus; turbid urine; a loathing of some things, and longing for others; a slow fever; dropsies of different parts, of which, or a consumption, the patient dies. It may be confounded with an ulcer of the uterus, or a gonorrhœa muliebris. See **GONORRHOEA**.

The fluor albus sometimes is discharged from the uterine vessels, and sometimes from the glands of the vagina. In the first case it stops when the menses begin to flow; in the latter it continues with them; and pregnant women are not exempted from it. At first, the parts of the membranæ adiposæ of the loins, kidneys, and the uterine appendages, are wasted by it: but at length the flux becomes acrimonious. When the flux is lacteous, it may be cured in fifteen days; the patient must feed sparingly, use frequent exercise, and sleep little. If this is not complied with, she must bleed in the arm, once or twice a month, and take purges and emetics; or, at least, frequent clysters. The efficacy of all these must be assisted with diaphoretics, decoctions of the woods, and diuretics.

In the semilacteous flux, an inspissating and nourishing diet will be best, such as creams, soups, boiled milk, roast meat, jellies, &c. Milk, or milk turned with a decoction of china, is very good. Narcotics are highly useful, especially if the patient is restless, or delirious. In the beginning, the dose must be small, but it may be gradually increased. When the vesiculæ lacteæ are relaxed, the tone must be restored with hot mineral baths, and fomentations; and injections of, and bathing in the same: the fumes may also be conveyed into the vagina with a funnel. Decoctions of the woods are also good;

good; as are diaphoretics, and diuretics a decoction of roots of eryngo and rest-harrow, with powder of millepedes, or glauher's salt.

If the lymphatic flux is attended with a scrophulous, scorbutic, or venereal taint, these disorders must first be removed. If the uterine lymphatics are compressed by scirrhoties, cancers, ganglions, or the like, regard must be had to the causes.

In obstructions of the glands of the uterus, begin with bleeding: then a gentle purge, or an emetic of iij gr. of tartar-emetic, or ipecacuanha: afterwards, if the patient's constitution is cold, attenuating aperients. If she is hot and bilious, with a sensible pain in the uterus, cooling broths and apozems, with the addition of cray-fish; asses milk, with a decoction of barley; chalybeate whey, with chervil boiled therein; gently purging mineral waters; baths and half baths are convenient in the summer.

**FLUSH-DECK**, in a ship. See **DECK**.

**FLUSHER**, in ornithology, a bird otherwise called the *lanius minor*, or lesser butcher-bird. See the article **LANIUS**.

**FLUSHING**, or **VLISSGEN**, a port town of Zealand, in Holland, five miles south of Middleburg: east long.  $3^{\circ} 25'$ , north lat.  $51^{\circ} 30'$ .

It is a town of great foreign trade, and has a good secure harbour.

**FLUTE**, *fistula*, an instrument of music, the simplest of all those of the wind kind. It is played on by blowing it with the mouth, and the tones or notes are changed by stopping and opening the holes disposed for that purpose along its side. The antient fistulæ, or flutes, were made of reeds, afterwards of wood, and last of metal: but how they were blown, whether as our flutes, or as hautboys, does not appear.

'Tis plain some had holes, which, at first, were but few, but afterwards increased to a great number, and some had none; some had single pipes, and some a combination of many, particularly Pan's syringa, which consisted of seven reeds joined together sideways.

*German* **FLUTE**, is an instrument intirely different from the common-flute. It is not, like that, put into the mouth to be played, but the end is stoppt with a tampion, or plug; and the lower lip is applied to a hole about two inches and a half, or three inches, distant from the

end. This instrument is usually about a foot and a half long; rather bigger at the upper end than the lower; and perforated with holes, besides that for the mouth, the lowest of which is stoppt and opened by the little finger's pressing on a brass, or sometimes, a silver key, like those in hautboys, bassoons, &c. It is found exceeding sweet and agreeable; and serves as a treble in a concert.

Coarse flutes, on importation, pay the gros, containing twelve dozen, 3s. 10<sup>2</sup>/<sub>10</sub>d. and on exportation draw back 3s. 4<sup>2</sup>/<sub>10</sub>d.

**FLUTE**, or **FLUYT**, is also a kind of long vessel, with flat ribs, or floor timbers; round behind, and swelled in the middle; serving chiefly for the carrying of provisions in fleets, or squadrons of ships, though it is also used for merchandize.

**FLUTES**, or **FLUTINGS**, in architecture, perpendicular channels, or cavities, cut along the shaft of a column, or pilaster. They are chiefly affected in the ionic order, where they had their first rise; though, indeed, they are used in all the richer orders, as the corinthian and composite; but seldom in the doric, and scarce ever in the tuscan.

Each column has twenty-four flutes, and each flute is hollowed in exactly a quadrant of a circle: but the doric has but twenty. Between the flutes are little spaces that separate them, which Vitruvius calls *stria*, and we list: though, in the doric, the flutes are frequently made to join to one another, without any intermediate space at all; the list being sharpened off to a thin edge, which forms a part of each flute. See **LIST**.

Vignola determines the depth of the flutes by taking the angle of the equilateral triangle for the center. Vitruvius describes the depth from the middle of the square, whose side is the breadth of the flute, which latter method makes them deep. Some columns have flutes that go winding round the shaft, spirally; but this is rather accounted an abuse. The flutes, or *striae*, are commonly filled up with a prominent or swelling ornament; sometimes plain, in form of a staff or reed; and sometimes a little curved, or enriched, in imitation of a rope, or otherwise. See the article **CABLED**.

Sometimes the flutings are made flat, and are called *Facettes*: but these have never such a good effect as the others. Vitruvius says, that when there are flutings in

the column, there ought also to be eggs and anchors in the quarter round of the capital, and even pearls and olives, in a baguette, to be made underneath, instead of annulets. These eggs and olives ought to be in the same number with the flutings, and to be regularly distributed.

**FLUVIALIS**, in botany, the name by which Vaillant calls the najas of Linnaeus. See the article **NAJAS**.

**FLUX**, in medicine, an extraordinary issue, or evacuation of some humours of the body.

Sometimes it is taken for all kinds of defluxions; in which sense it is the same with a catarrh, or coryza: See the article **CATARRH**.

Sometimes it signifies a looseness, or flux, of the belly, which is of four kinds. When the food is discharged by stool undigested, it is called a lientery, or lienteric flux. When the chyle is discharged, it is called coeliaca. When excrementitious humours are discharged, as cholera, phlegm, &c. it is called simply a diarrhoea; and when the stools are bloody, it is called a dysentery, or bloody-flux. See the articles **LIENTERY**, **COELIAC PASSION**, **DIARRHOEA**, and **DYSENTERY**.

Again, there is an hepatic flux: but this is supposed to be no other than the hæmorrhoidal flux. See the article **HÆMORRHOIDS**.

**FLUX** of the urine. See **DIABETES**.

Women are subject to three several kinds of fluxes extraordinary; the first, called the menses, or menstrual flux; the second is after delivery, and is called lochia: these are regular and natural. See the articles **MENSES** and **LOCHIA**.

The third, being irregular and preternatural, is termed the fluor albus, or whites. See **FLUOR-ALBUS**.

**FLUX**, in hydrography. See **TIDE**.

**FLUX**, in metallurgy, whatever can cause a body otherwise not at all, or hardly, fusible by fire, to melt.

Fluxes, says Dr. Shaw, seem reducible to two general kinds, viz. the vitreous and the saline. By the vitreous we understand all those which either have of themselves, or readily assume, a glassy form in the fire; among the principal whereof are reckoned the glass of lead, the glass of antimony and borax. By the saline kind of fluxes are understood all those that are composed of salts, whether tartar, nitre, fixed alkali, or the like. Among the principal of this kind we reckon the

black flux, sandiver, kelp, &c. See the articles **SANDIVER** and **KELP**.

The method of making the black flux is as follows. Take one part nitre, and two parts common tartar, and reducing each to powder, mix them together: deflagrate the whole in a crucible, by lighting the mixture a-top, which thus turns to a kind of alkaline coal, that is to be pulverized and kept close in a glass, to prevent its dissolving, as it would do in a moist air.

The vitreous kind of fluxes seem more immediately destined to act upon the stony or vitrescible matter, wherewith stubborn ores are frequently mixed, and the saline kind to act more immediately upon the ore itself, for the due exclusion or separation of the metal. The more kindly ores require no flux to make them run thin, or to afford all the metal they contain, and sometimes ores are so kindly as to contain their own fluxes within themselves. Thus, we have met with copper-ores, which being barely ground to powder, and melted without any addition in a common wind-furnace, have yielded as much, or even more, pure metal at the first operation, than could be obtained from them by means of the usual fluxes. Whence we see that artificial fluxes are not always necessary; or that the principal use of them is for the stubborn or less tractable ores; and these are sometimes so exceedingly hard to fuse and reduce to a metalline form, that it requires the utmost power of art to treat them advantageously in the larger way of business, where no considerable expence can usually be allowed for fluxes. And on this account it is, that many mines remain unwrought, as being untractable without great charges. Whence the improvement of the business of fluxes, so as to render them cheap and effectual, might greatly contribute to the improvement of metallurgy. The matter in soft ores, which renders them so fusible, has been found by an experiment upon copper-ore, to be a kind of bituminous substance, capable of melting by a strong heat, into a soft and black kind of glass.

Some of the most powerful and cheap simple fluxes hitherto known, are dried wine-lees, dried cow-dung and horse-dung, dried river-mud, fuller's earth, iron-silings, common salt, glass, kelp, or pot-ashes, sandiver, &c. which may be used in the larger work; as nitre, tartar,



tartar, borax, sal ammoniac, mercury sublimate, &c. may in the smaller, or for the making of assays.

As for compound fluxes, they are numerous; almost every operator having his favourite flux. And, certainly, some fluxes are better adapted than others to certain ores. But perhaps a few general ones might be fixed upon, which should serve instead of all those hitherto commonly known and used: we will here recommend three, which are powerful, almost general, and not expensive.

1. Take of nitre, prepared by long boiling it in lime-water; of sea salt, melted in the fire; sandiver; and dry wine-lees, each one part; glass of lead, three parts; and powdered glass, eight parts; mix them all well together. This flux added in an equal weight, will fuse a very stubborn ore.

2. For a still stronger, take equal parts of white tartar, common salt and nitre, prepared as above: calcine them to a white powder; and mix therewith its own weight of glass and lead; and of this flux add two parts to one of the most stubborn ore.

3. For a powerful saline flux. Take of the strongest soapboiler's lees, four pounds; white tartar, and common salt melted in the fire, each one pound: boil them together with five gallons of human urine, to a dry salt. This flux is particularly proper where sulphur and cobalt abound, and render the ore very refractory.

But the great secret, in making and adapting fluxes, is not only to separate the metal already ripened in the ore, but even to mature and ripen the crude and immature part of the ore in the fire: something of this kind, we apprehend, may be effected, as having reason to believe, that certain fluxes will obtain a larger yield of metal from certain ores, than other fluxes in common use, tho' esteemed of the best, and though they are perhaps of the dearest kind. Thus clean iron-slings will often do more than borax. But as the scales and crocus, or rust, of iron, have been commonly used, instead of pure and perfect iron itself, for a flux, few operators appear acquainted with the excellence of perfect iron employed for this purpose. And many advantages are now obtained, by a prudent mixing of one ore with another of the same denomination, and with the

flags, or recrements of metals, in this way of flux.

The melting of gold and silver, and of their calxes, is greatly promoted by glass of lead, alkaline salts, &c. but when gold and silver, in the fusion itself, are to be purged from other metals and semimetals, it is proper to use nitre only; or if not so, nitre always must be mixed with the other salts; for the semimetals and the four less perfect metals are destroyed by nitre.

In this operation, nitre, by its detonation with their sulphurs, is in part alkalisied, and, by the help of a gentle fire, turns their calxes into a vitreous, and much attenuated scoriæ.

From hence, the reason is plain why gold and silver, when made brittle, are readily restored to their malleability by nitre; for the same metals, and among the metals, lead and tin most of all communicate this fault to gold and silver: but these being changed, as before observed, by nitre, are then rejected by gold and silver in a simple fusion, so that they can no longer mix with these metals, unless they are themselves first again reduced to their metallic state; and there is beside these, no other body that can be mixed with silver and gold, to render them brittle, unless crude charcoal, happening to fall into the vessel wherein these metals are melted, should impregnate them with something arsenical; there being some arsenic contained in coals of this kind, as has been demonstrated by Stahl and Hoffman.

The less perfect metals, and semi-metals, melt more easily by adding salts to them, than of themselves: they always, however, lose a great deal of their substance by this means; and this is more particularly the case in regard to copper and iron. To amend this, it is necessary to add some kind of fat body, which prevents the destruction, and even reduces the metals already destroyed; and this is more necessary when the calxes, prepared either by burning, or by a detonation with nitre, are to be reduced. A caution, very necessary to be observed, is, that all fluxes must be kept and used very dry, for moist salts foam very much; and when the operations are made in close vessels, if the fire is quickly increased, not being able to get rid of the moisture, the vessels will split and break.

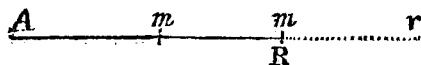
Fluxes being greatly attenuated, though confined in close vessels, part with their oily principle, and their alkaline salt remaining, begin to corrode and consume the vessels, of what matter soever they are made, and finally make their way through them, and get out. The first of these accidents is prevented by adding coal-dust, which will never part with its oil without the help of a free air; and the others by an admixture of common glass, made of a due mixture of flints, and fixed alkali; for this is sufficiently fusible, and melts with the fluxes; and by its viscosity in some sort coagulates and holds the salt of the flux together, and prevents it from easily corroding the vessels.

**FLUXION**, in mathematics, denotes the velocity by which the fluents or flowing quantities increase or decrease; and may be considered as positive or negative, according as it relates to an increment or decrement.

The doctrine of fluxions, first invented by sir Isaac Newton, is of great use in the investigation of curves, and in the discovery of the quadratures of curvilinear spaces, and their rectifications. In this method, magnitudes are conceived to be generated by motion, and the velocity of the generating motion is the fluxion of the magnitude. Thus, the velocity of the point that describes a line, is its fluxion, and measures its increase or decrease.

When the motion of this point is uniform, its fluxion or velocity is constant, and may be measured by the space described in a given time. But when the motion varies, the fluxion or velocity at any given point is measured by the space that would be described in a given time, if the motion was to be continued uniformly from that term.

Thus, let the point  $m$  be conceived to move



from A, and generate the variable right line  $Am$ , by a motion any how regulated; and let its velocity, when it arrives at any proposed position or point R, be such as would, was it to continue uniform from that point, be sufficient to describe the line  $Rr$ , in the given time allotted for the fluxion, then will  $Rr$  be the fluxion of the variable line  $Am$ , in the term or point R. See **MOTION** and **VELOCITY**. The fluxion of a plane surface is conceived in like manner, by supposing a

given right line  $mn$  (plate XCVIII. fig. 6. n<sup>o</sup> 1.) to move parallel to itself, in the plane of the parallel and immoveable lines  $AF$  and  $BG$ : for if, as above,  $Rr$  be taken to express the fluxion of the line  $Am$ , and the rectangle  $Rr \cdot s$  be completed; then that rectangle, being the space which would be uniformly described by the generating line  $mn$ , in the time that  $Am$  would be uniformly increased by  $mr$ , is therefore the fluxion of the generated rectangle  $Bm$ , in that position. If the length of the generating line  $mn$ , continually varies, the fluxion of the area will still be expounded by a rectangle under that line, and the fluxion of the absciss or base: for let the curvilinear space  $Anm$  (*ibid.* n<sup>o</sup> 2.) be generated by the continual and parallel motion of the variable line  $mn$ ; and let  $Rr$  be the fluxion of the base or absciss  $Am$ , as before, then the rectangle  $Rr \cdot s$ , will be the fluxion of the generated space  $Amm$ . Because, if the length and velocity of the generating line  $mn$ , were to continue invariable from the position  $RS$ , the rectangle  $Rr \cdot s$  would then be uniformly generated with the very velocity where-with it begins to be generated, or with which the space  $Amm$  is increased in that position.

**Notation of FLUXIONS.** Invariable quantities, or those which neither increase nor decrease, are represented by the first letters of the alphabet, as  $a, b, c, d$ , &c. and the variable or flowing quantities by the last letters, as  $v, w, x, y, z$ : thus, the diameter of a given circle may be denoted by  $a$ ; and the sine of any arch thereof, considered as variable, by  $x$ . The fluxion of a quantity represented by a single letter, is expressed by the same letter with a dot or full point over it: thus, the fluxion of  $x$  is represented by  $\dot{x}$ , and that of  $y$  by  $\dot{y}$ . And, because these fluxions are themselves often variable quantities, the velocities with which they either increase or decrease, are the fluxions of the former fluxions, which may be called second fluxions, and are denoted by the same letters with two dots over them, as  $\ddot{x}, \ddot{y}$ . In the same manner the fluxions of second fluxions are called third fluxions, and denoted by the same letters with three dots over them, as  $\dddot{x}, \dddot{y}$ ; and so on for fourth, fifth, &c. fluxions, which are expressed by the same letters, with four, five, &c. dots over them, as  $\ddot{\ddot{x}}, \ddot{\ddot{y}}$ ; and  $\ddot{\ddot{\ddot{x}}}, \ddot{\ddot{\ddot{y}}}$ , &c. If the

flowing

flowing quantity be a fraction, as  $\frac{xx}{d-y}$ , its first, second, third, &c. fluxions are expressed by one, two, three, &c. dots placed in the break of the line that separates the numerator from the denominator, thus  $\frac{\dot{x}x}{d-y}$ ,  $\frac{\ddot{x}x}{d-y}$ ,  $\frac{\ddot{\ddot{x}}x}{d-y}$ , &c.

The fluxions of surds are denoted in the same manner, by one, two, or more dots placed in the break of the vinculum of the radical character: thus, if the surd quantity be  $\sqrt{x-y}$ , then will its first, second, third, &c. fluxions be  $\sqrt{\dot{x}-\dot{y}}$ ,  $\sqrt{\ddot{x}-\ddot{y}}$ ,  $\sqrt{\ddot{\ddot{x}}-\ddot{\ddot{y}}}$ , &c.

The whole doctrine of fluxions consists in solving the two following problems, viz.

1. From the fluent, or variable flowing quantity given, to find the fluxion; which constitutes what is called the direct method of fluxions. 2. From the fluxion given, to find the fluent, or flowing quantity; which makes the inverse method of fluxions.

*Direct method of FLUXIONS.* The doctrine of this part of fluxions is comprized in these rules.

1. To find the fluxion of any simple variable quantity, the rule is to place a dot over it: thus, the fluxion of  $x$  is  $\dot{x}$ , and of  $y$ ,  $\dot{y}$ . Again, the fluxion of the compound quantity  $x+y$ , is  $\dot{x}+\dot{y}$ ; also the fluxion of  $x-y$ , is  $\dot{x}-\dot{y}$ .

2. To find the fluxion of any given power of a variable quantity, multiply the fluxion of the root by the exponent of the power, and the product by that power of the same root, whose exponent is less by unity than the given exponent. This rule is expressed more briefly, in algebraical characters, by  $nx^{n-1}\dot{x}$  = the fluxion of  $x^n$ . Thus, the fluxion of  $x^3$  is  $\dot{x} \times 3 \times x^2 = 3x^2\dot{x}$ ; and the fluxion of  $x^5$  is  $\dot{x} \times 5 \times x^4 = 5x^4\dot{x}$ . In the same manner the fluxion of  $(a+y)^7$  is  $7\dot{y} \times (a+y)^6$ ; for the quantity  $a$  being constant,  $\dot{a}$  is the true fluxion of the root  $a+y$ . Again, the fluxion of  $(a^2+z^2)^{\frac{3}{2}}$  will be  $\frac{3}{2} \times 2z\dot{z} \times (a^2+z^2)^{\frac{1}{2}}$ : for here,  $x$  being put  $=a^2+z^2$ , we have  $\dot{x} = 2z\dot{z}$ ; and therefore  $\frac{3}{2} x^{\frac{1}{2}}\dot{x}$ , for the fluxion of  $x^{\frac{3}{2}}$  (or  $(a^2+z^2)^{\frac{3}{2}}$ ) is  $= 3z\dot{z}\sqrt{a^2+z^2}$ .

3. To find the fluxion of the product of several variable quantities, multiply the

fluxion of each, by the product of the rest of the quantities; and the sum of the products, thus arising, will be the fluxion sought. Thus, the fluxion of  $xy$  is  $\dot{x}y+y\dot{x}$ ; that of  $xyz$ , is  $\dot{x}yz+\dot{y}xz+\dot{z}xy$ ; and that of  $vwyz$  is  $\dot{v}xyz+\dot{w}vz+\dot{y}vwz+\dot{z}vwy$ . Again, the fluxion of  $a+x \times b-y$  is  $ab+bx-\dot{a}y-\dot{y}x$ .

4. To find the fluxion of a fraction, the rule is, from the fluxion of the numerator multiplied by the denominator, subtract the fluxion of the denominator multiplied by the numerator, and divide the remainder by the square of the denominator. Thus the fluxion of  $\frac{x}{y}$ , is  $\frac{y\dot{x}-x\dot{y}}{y^2}$ ;

that of  $\frac{x}{x+y}$ , is  $\frac{\dot{x} \times x+y-\dot{x}+\dot{y} \times x}{(x+y)^2} = \frac{y\dot{x}-x\dot{y}}{(x+y)^2}$ ; and that of  $\frac{x+y+z}{x+y}$ , or  $1+\frac{z}{x+y}$ , is  $\frac{\dot{z} \times x+y-\dot{x}+\dot{y} \times z}{(x+y)^2}$ ; and

so of others.

In the examples hitherto given, each is resolved by its own particular rule; but in those that follow, the use of two or more of the above rules is requisite: thus (by rule 2. and 3.) the fluxion of  $x^2y^2$  is found to be  $2x^2y\dot{y}+2y^2x\dot{x}$ ; that of  $\frac{x^2}{y^2}$ , is found (by rule 2. and 4.) to be

$$\frac{2y^2x\dot{x}-2x^2y\dot{y}}{y^4}; \text{ and that of } \frac{x^2y^2}{z}, \text{ is}$$

$$\frac{(2x^2y\dot{y}+2y^2x\dot{x}) \times z - x^2y^2\dot{z}}{z^2}.$$

5. When the proposed quantity is affected by a coefficient, or constant multiplier, the fluxion found as above must be multiplied by that coefficient or multiplier: thus, the fluxion of  $5x^3$ , is  $15x^2\dot{x}$ ; for the fluxion of  $x^3$  is  $3x^2\dot{x}$ , which, multiplied by 5, gives  $15x^2\dot{x}$ . And, in the very same manner, the fluxion of  $ax^n$  will be  $nax^{n-1}\dot{x}$ .

Having thus explained the manner of determining the first fluxions of variable quantities, it remains to say something of second, third, &c. fluxions. We have already observed, that the second fluxion of a quantity is the fluxion of the first fluxion; and by the third fluxion is meant the fluxion of the second; the fourth, of the third; and so on. The fluxions, therefore, of every order are

only

only the measures of the velocities by which their respective flowing quantities, viz. the fluxions of the immediately preceding order, are generated. Hence it appears, that a second fluxion always shews the rate of the increase or decrease of the first fluxion; and that the third, fourth, &c. fluxions differ in nothing, except their order and notation, from first fluxions; and therefore are also determinable in the very same manner, by the rules already laid down: thus (by rule 4.) the (first) fluxion of  $x^3$  is  $3x^2\dot{x}$ : and if  $\dot{x}$  is supposed constant, that is, if the root  $x$  be generated with an equable or uniform velocity, the fluxion of  $3x^2\dot{x}$  (or  $3\dot{x}\times x^2$ ) again taken (by the same rule) will be  $3\dot{x}\times 2x\dot{x}$ , or  $6x\dot{x}^2$ ; which therefore is the second fluxion of  $x^3$ . Again, the third fluxion of  $x^3$ , or the fluxion of  $6x\dot{x}^2$ , is found to be  $6\dot{x}^3$ ; further than which we cannot go in this case, because the last fluxion,  $6\dot{x}^3$ , is here a constant quantity.

In the preceding example, the root  $x$  is supposed to be generated with an equable velocity: but if the velocity be an increasing or decreasing one, then  $\dot{x}$ , expressing the measure thereof, being variable, will also have its fluxion, which is denoted, as said above, by  $\ddot{x}$ ; and the fluxion of  $\dot{x}$  by  $\ddot{x}$ , and so on, with respect to the higher orders.

Here follow some examples, wherein the root  $x$  (or  $y$ ) is supposed to be generated with a variable velocity. Thus, the fluxion of  $x^3$  being  $3x^2\dot{x}$  (or  $3x^2\times\dot{x}$ ) the fluxion of  $3x^2\dot{x}$ , considered as a rectangle, will (by rule 3.) be found to be  $6x\dot{x}\times\dot{x}+3x^2\times\ddot{x}=6x\dot{x}^2+3x^2\ddot{x}$ ; which is the second fluxion of  $x^3$ . Moreover, from the fluxion last found, we shall in like manner get  $6\dot{x}\times\dot{x}^2+6x\dot{x}\times 2\dot{x}\ddot{x}+6x\dot{x}\times\ddot{x}+3x^2\times\ddot{\ddot{x}}$  (or  $6\dot{x}^3+18x\dot{x}\ddot{x}+3x^2\ddot{\ddot{x}}$ ) for the third fluxion of  $x^3$ . Thus also, if  $y=nx^{n-1}\dot{x}$ , then will  $\dot{y}=n(n-1)\times x^{n-2}\dot{x}^2+n\ddot{x}x^{n-1}$ ; and if  $\ddot{z}=\dot{x}\dot{y}$ , then will  $2\ddot{z}=\dot{x}\ddot{y}+\dot{y}\ddot{x}$ : and so of others.

The reader is here desired, once for all, to take particular notice, that the fluxions of all kinds and orders whatever, are contemporaneous, or such as may be generated together, with their respective velocities, in one and the same time.

*Inverse method of FLUXIONS*, or the manner of determining the fluents of given fluxions.

If what is already delivered, concerning the direct method, be duly considered, there will be no great difficulty in conceiving the reasons of the inverse method: though the difficulties that occur in this last part, upon another account, are indeed vastly great. It is an easy matter, or not impossible at most, to find the fluxion of any flowing quantity whatever; but, in the inverse method, the case is quite otherwise; for, as there is no method for deducing the fluent from the fluxion *a priori*, by a direct investigation; so it is impossible to lay down rules for any other forms of fluxions, than those particular ones that we know, from the direct method, belong to such kinds of flowing quantities: thus, for example, the fluent of  $2x\dot{x}$  is known to be  $x^2$ ; because, by the direct method, the fluxion of  $x^2$  is found to be  $2x\dot{x}$ : but the fluent of  $y\dot{x}$  is unknown, since no expression has been discovered that produces  $y\dot{x}$  for its fluxion. Be this as it will, the following rules are those used by the best mathematicians, for finding the fluents of given fluxions.

1. To find the fluent of any simple fluxion, you need only write the letters without the dots over them: thus, the fluent of  $\dot{x}$  is  $x$ , and that of  $a\dot{x}+b\dot{y}$ , is  $ax+by$ .

2. To assign the fluent of any power of a variable quantity, multiplied by the fluxion of the root; first divide by the fluxion of the root, add unity to the exponent of the power, and divide by the exponent so increased: for dividing the fluxion  $nx^{n-1}\dot{x}$  by  $\dot{x}$ , it becomes

$nx^{n-1}$ ; and adding 1 to the exponent  $(n-1)$  we have  $nx^n$ ; which, divided by

$n$ , gives  $x^n$ , the true fluent of  $nx^{n-1}\dot{x}$ . Hence, by the same rule, the fluent of  $3x^2\dot{x}$  will be  $=x^3$ ; that of  $2x^3\dot{x}=x^4$ ; that of  $y^{\frac{1}{2}}\dot{y}=\frac{2}{3}y^{\frac{3}{2}}$ ; that of

$ay^{\frac{5}{3}}\dot{y}=\frac{3ay^{\frac{8}{3}}}{8}$ ; and that of  $y^{\frac{m}{n}}\dot{y}=y^{\frac{m}{n}+1}$

$y^{\frac{m}{n}+1}=\frac{ny^{\frac{m}{n}+1}}{\frac{m}{n}+1}$ ; that of  $\frac{a\dot{x}}{x^n}$ , or

$a\dot{x}x^{-n}=\frac{ax^{1-n}}{1-n}$ ; that of  $\frac{a+z}{a+z}^3\times\dot{z}=\frac{(a+z)^4}{4}$ ; and that of  $\frac{a^m+z^m}{a^m+z^m}^n\times\dot{z}$

$$x^{m-1} \dot{x} = \frac{a^m + x^m}{m \times n + 1} \dot{x} + 1$$

In assigning the fluents of given fluxions, it ought to be considered, whether the flowing quantity, found as above, requires the addition or subtraction of some constant quantity, to render it complete: thus, for instance, the fluent of  $n x^{n-1} \dot{x}$  may be either represented by  $x^n$  or by  $x^n \pm a$ ; for  $a$  being a constant quantity, the fluxion of  $x^n \pm a$ , as well as of  $x^n$ , is  $n x^{n-1} \dot{x}$ .

Hence it appears, that the variable part of a fluent only can be assigned by the common method, the constant part being only assignable from the particular nature of the problem. Now to do this, the best way is to consider how much the variable part of the fluent, first found, differs from the truth, when the quantity which the whole fluent ought to express, is equal to nothing; then that difference, added to, or subtracted from, the said variable part, as occasion requires, will give the fluent truly corrected. To make this plainer by an example or two, let  $y = a + x^4$ . Here we first find

$$y = \frac{a + x^4}{4}; \text{ but when } y = 0, \text{ then}$$

$$\frac{a + x^4}{4} \text{ becomes } = \frac{a^4}{4}; \text{ since } x, \text{ by hy-}$$

pothesis, is then = 0: therefore  $\frac{a + x^4}{4}$

always exceeds  $y$  by  $\frac{a^4}{4}$ ; and so the flu-

$$\text{ent, properly corrected, will be } y = \frac{a + x^4 - a^4}{4} = a^3 x + \frac{3 a^2 x^2}{2} + a x^3 +$$

$$\frac{x^4}{4}. \text{ Again, let } y = a^m + x^m \dot{x} \times x^{m-1} \dot{x};$$

$$\text{here we first have } y = \frac{a^m + x^m}{m \times n + 1};$$

and making  $y = 0$ , the latter part of the

$$\text{equation becomes } \frac{a^m}{m \times n + 1} = \frac{a^{m+n+m}}{m \times n + 1};$$

whence the equation or fluent, properly

$$\text{corrected, is } y = \frac{a^m + x^m}{m \times n + 1} - \frac{a^{m+n+m}}{m \times n + 1}.$$

Hitherto  $x$  and  $y$  are both supposed equal to nothing, at the same time; which will

not always be the case: thus, for instance, though the sine and tangent of an arch are both equal to nothing, when the arch itself is so; yet the secant is then equal to the radius. It will therefore be proper to add some examples, wherein the value of  $y$  is equal to nothing, when that of  $x$  is equal to any given quantity  $a$ . Thus, let the equation  $y = x^2 \dot{x}$ , be proposed; whereof the fluent first found is  $y = \frac{x^3}{3}$ ; but when  $y$

$$= 0, \text{ then } \frac{x^3}{3} = \frac{a^3}{3}, \text{ by the hypothesis;}$$

$$\text{therefore the fluent, corrected, is } y = \frac{x^3 - a^3}{3}. \text{ Again, suppose } y = x^n \dot{x};$$

$$\text{then will } y = \frac{x^{n+1}}{n+1}; \text{ which, corrected,}$$

$$\text{becomes } y = \frac{a^{n+1} - x^{n+1}}{n+1}. \text{ And last-}$$

$$\text{ly, if } y = \frac{c^3 + b x^2}{3 b} \dot{x} \times x \dot{x}; \text{ then, first,}$$

$$y = \frac{c^3 + b x^2}{3 b}; \text{ therefore the fluent cor-}$$

$$\text{rected is } y = \frac{c^3 + b x^2}{3 b} - \frac{c^3 + b a^2}{3 b}.$$

3. To find the fluents of such fluxionary expressions as involve two or more variable quantities, substitute, instead of such fluxion, its respective flowing quantity; and, adding all the terms together, divide the sum by the number of terms, and the quotient will be the fluent. Thus,

$$\text{the fluent of } \dot{x}y + y\dot{x} = \frac{xy + xy}{2} = \frac{2xy}{2} =$$

$$xy; \text{ and the fluent of } \dot{x}yz + y\dot{x}z + \dot{y}zx = \frac{xyz + xyz + xyz}{3} = \frac{3xyz}{3} = xyz.$$

But it seldom happens that these kinds of fluxions, which involve two variable quantities in one term, and yet admit of known and perfect fluents, are to be met with in practice.

Having thus shewn the manner of finding such fluents as can be truly exhibited in algebraic terms, it remains now to say something with regard to those other forms of expressions involving one variable quantity only; which yet are so affected by compound divisors and radical quantities, that their fluents cannot be accurately determined by any method whatsoever. The only method with regard to these, of which there are innumerable kinds, is to find their fluents by approximation, which,

which, by the method of infinite series, may be done to any degree of exactness. See the article *SERIES*.

Thus, if it were proposed to find the fluent of  $\frac{ax}{a-x}$ , it becomes necessary to throw

the fluxion into an infinite series, by dividing  $ax$  by  $a-x$ : thus,  $ax \div a-x = x + \frac{x^2}{a} + \frac{x^3}{a^2} + \frac{x^4}{a^3} + \frac{x^5}{a^4} + \dots$ , &c.

Now the fluent of each term of this series, may be found by the foregoing rules to be  $x + \frac{x^2}{2a} + \frac{x^3}{3a^2} + \frac{x^4}{4a^3} + \frac{x^5}{5a^4} + \dots$ , &c.

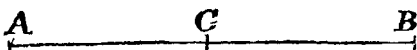
Again, to approximate the fluent of  $\frac{a^2-x^2}{c^2-x^2} \times x^n$ , we first find the value of  $\frac{a^2-x^2}{c^2-x^2}$  expressed in a series to be

$\frac{a}{c} + \frac{a}{2c^3} - \frac{1}{2ac} \times x^2 + \frac{3a}{8c^5} - \frac{1}{4ac^3} - \frac{1}{8a^3c} \times x^4 + \frac{5a}{16c^7} - \frac{3}{16ac^5} - \frac{1}{16a^3c^3} - \frac{1}{16a^5c} \times x^6 + \dots$ , &c. which value being multiplied by  $x^n$ , and the fluent taken by the

rules above laid down, we get  $\frac{ax^{n+1}}{n+1 \times c} +$

$\frac{a}{2c^3} \times \frac{x^{n+3}}{n+3} + \frac{3a}{8c^5} - \frac{1}{4ac^3} - \frac{1}{8a^3c} \times \frac{x^{n+5}}{n+5} + \frac{5a}{16c^7} - \frac{3}{16ac^5} - \frac{1}{16a^3c^3} - \frac{1}{16a^5c} \times \frac{x^{n+7}}{n+7} + \dots$ , &c.

In order to shew the usefulness of fluxions, we shall give an example or two. Thus, suppose it were required to divide the given right line *AB* into two such parts,



*AC*, *CB*, that their products or rectangles, may be the greatest possible. Let *AB* = *a*, and let the part *AC*, considered as variable (by the motion of *C* towards *B*) be denoted by *x*. Then *BC* being = *a* - *x*, we have *AC* × *BC* = *ax* - *xx*, whose fluxion  $ax - 2xx$  being put = 0, we get  $ax = 2xx$ ; and, consequently,  $x = \frac{1}{2}a$ . Hence it appears that *AC* (or *x*) must be exactly one half of *AB*.

Again, suppose it were required to find the solid contents of a spheroid, *AFBH* (plate *XCVIII.* fig. 6. n<sup>o</sup> 3.) Let the axis *AB*, about which the solid is generated, be = *a*, the radius = *p* = 1, and the other axis *FH* of the generating ellipsis = *b*; then, from the property of the ellipsis, we have  $a^2 : b^2 :: AD \times BD$  ( $x \times a - x$ ) :  $DE^2$  ( $y^2$ ). Hence  $y^2 = \frac{b^2}{a^2} \times ax - xx$ ; and the fluxion of the

solid  $\dot{s} (= py^2 \dot{x}) = \frac{pb^2}{a^2} \times ax\dot{x} - x^2\dot{x}$ ;

and the solidity  $s = \frac{pb^2}{a^2} \times \frac{1}{2} axx - \frac{1}{3} x^3$

= the segment *AIE*; which, when *AD* (*x*) = *AB* (*a*), becomes  $\left( \frac{pb^2}{a^2} \times \frac{1}{2} a^3 - \frac{1}{3} a^3 \right)$

$\frac{1}{8} pab^2$  = the content of the whole spheroid. Where, if *b* (*FH*) be taken = *a* (*AB*), we shall also get  $\frac{1}{8} pa^3$  for the true content of the sphere, whose diameter is *a*. Hence a sphere or spheroid is  $\frac{2}{3}$  of its circumscribing cylinder: for the area of the circle *FH* being expressed by  $\frac{pb^2}{4}$ , the content of the cylinder whose

diameter is *FH*, and altitude *AB*, will be  $\frac{pb^2a}{4}$ ; of which  $\frac{1}{8} pab^2$  is evidently two third parts.

For the other uses of fluxions, see the articles *MAXIMIS & minimis*, *QUADRATURE*, *TANGENTS*, *SOLIDS*, &c.

*FLUXION*, or rather *DEFLUXION*, in medicine. See the article *DEFLUXION*.

*FLY*, in zoology, a large order of insects, the distinguishing characteristic of which is, that their wings are transparent; by this they are distinguished from beetles, butterflies, and grasshoppers. See the articles *BETTER*, *BUTTERFLY*, &c.

Flies are subdivided into those which have four, and those which have two wings.

Of those with four wings, there are several genera or kinds, as the ant, apis, tenthredo, ichneumon, &c. See the articles *ANT*, *APIS*, &c.

Of those with two wings, there are likewise several kinds, as the gad-fly, wasp-fly, gnat, tipula, &c. See the article *GAD FLY*, &c.

Those who desire a more particular account of the anatomy, generation, structure, and manifold subdivisions of flies, may consult *Reaumur's History of Insects*, tom. 4.

FLY,

**FLY**, in mechanics, a cross with leaden weights at its ends, or rather a heavy wheel at right angles to the axis of a windlass, jack, or the like; by means of which the force of the power, whatever it be, is not only preserved, but equally distributed in all parts of the revolution of the machine.

The fly may be applied to several sorts of engines, whether moved by men, horses, wind, or water, or any other animate or inanimate power; and is of great use in those parts of an engine which have a quick circular motion, and where the power or the resistance act unequally in the different parts of a revolution. This has made some people imagine, that the fly adds a new power; but tho' it may be truly said to facilitate the motion, by making it more uniform, yet upon the whole it causes a loss of power, and not an increase: for as the fly has no motion of its own, it certainly requires a constant force to keep it in motion; not to mention the friction of the pivots of the axis, and the resistance of the air. The reason, therefore, why the fly becomes useful in many engines, is not that it adds a new force to them; but because, in cases where the power acts unequally, it serves as a moderator to make the motion of revolution almost every where equal: for as the fly has accumulated in itself a great degree of power, which it equally and gradually exerts, and as equally and gradually receives, it makes the motion in all parts of the revolution pretty nearly equal and uniform. The consequence of this is, that the engine becomes more easy and convenient to be acted and moved by the impelling force; and this is the only benefit obtained by the fly.

The best form for a fly, is that of a heavy wheel or circle, of a fit size, as this will not only meet with less resistance from the air, but being continuous, and the weight every where equally distributed through the perimeter of the wheel, the motion will be more easy, uniform, and regular. In this form, the fly is most aptly applied to the perpendicular drill, which it likewise serves to keep upright by its centrifugal force: also to a windlass or common winch, where the motion is quick; for in pulling upwards from the lower part, a person can exercise more power than in thrusting forward in the upper quarter; where, of course, part of his force would be lost, were it not ac-

cumulated and conserved in the equable motion of the fly. Hence, by this means, a man may work all day in drawing up a weight of 40 lb. whereas 30 lb. would create him more labour in a day without the fly.

In order to calculate the force of the fly joined to the screw for stamping the image upon coins, let us suppose the two arms of the fly to be each fifteen inches long, measuring from the center of the weight to the axis of motion, the weights to be fifty pounds each, and the diameter of the axis pressing upon the dye, to be one inch. If every stroke be made in half a second, and the weights describe an half circumference, which in this case will be four feet, the velocity will at the instant of the stroke be at the rate of eight feet in a second, so that the momentum of it will be 800; but the arms of the fly being as levers, each fifteen inches long, whilst the semi-axis is only half an inch, we must increase this force thirty times, which will give 24,000; an immense force, equal to 100 lb. falling 120 feet, or near two seconds in time; or to a body of 750 lb. falling 16  $\frac{1}{2}$  feet, or one second in time. Some of the engines for coining crown-pieces have the arms of the fly five times as long, and the weights twice as heavy; so that the effect is ten times greater. See COINING.

**FLY**, in the sea-language, that part of the mariner's compass, on which the several winds or points are drawn. See the article COMPASS.

*Let fly the sheet*, is a word of command to let loose the sheet, in case of a gust of wind, lest the ship should overset, or spend her top-sails and masts; which is prevented by letting the sheet go a-main, that it may hold no wind.

**FLY**, among sportsmen. When a hawk missing her quarry, betakes herself to the next check, as crows, &c. they say she *flies on head*. When a hawk flies at great birds, as cranes, geese, &c. they say she *flies gross*. A horse is said to fly the heels, when he obeys the spurs.

**FLY-BOAT**, a large vessel with a double prow, carrying from seven to eight hundred weight of goods.

**FLYERS**, in architecture, such stairs as go straight, and do not wind round; nor have the steps made tapering, but the fore and back part of each stair, and the ends, respectively parallel to one another; so that if one flight do not carry you to your intended height, there is a broad

half-space, from whence you begin to fly again, with steps every where of the same length and breadth, as before.

**FLYING**, the progressive motion of a bird, or other winged animal, in the liquid air. The parts of birds chiefly concerned in flying, are the wings, by which they are sustained or wafted along. The tail, Messieurs Willughby, Ray, and many others, imagine to be principally employed in steering and turning the body in the air, as a rudder: but Borelli has put it beyond all doubt, that this is the least use of it, which is chiefly to assist the bird in its ascent and descent in the air; and to obviate the vacillations of the body and wings: for, as to turning to this or that side, it is performed by the wings, and inclinations of the body, and but very little by the help of the tail. The flying of a bird, in effect, is quite a different thing from the rowing of a vessel. Birds do not vibrate their wings towards the tail, as oars are struck towards the stern, but waft them downwards: nor does the tail of the bird cut the air at right angles, as the rudder does the water; but is disposed horizontally, and preserves the same situation what way soever the bird turns.

In effect, as a vessel is turned about on its center of gravity to the right, by a brisk application of the oars to the left, so a bird in beating the air with its right wing alone, towards the tail, will turn its fore part to the left. Thus pigeons, changing their course to the left, would labour it with their right wing, keeping the other almost at rest. Birds of a long neck alter their course by the inclinations of their head and neck, which altering the course of gravity, the bird will proceed in a new direction.

*The manner of FLYING* is thus: the bird first bends his legs, and springs with a violent leap from the ground; then opens and expands the joints of his wings, so as to make a right line perpendicular to the sides of his body: thus the wings, with all the feathers therein, constitute one continued lamina. Being now raised a little above the horizon, and vibrating the wings with great force and velocity perpendicularly against the subject air, that fluid resists those succussions, both from its natural inactivity and elasticity, by means of which the whole body of the bird is protruded. The resistance the air makes to the withdrawing of the wings, and consequently

the progress of the bird, will be so much the greater, as the waft or stroke of the fan of the wing is longer: but as the force of the wing is continually diminished by this resistance, when the two forces come to be in equilibrio, the bird will remain suspended in the same place; for the bird only ascends so long as the arch of air the wing describes, makes a resistance equal to the excess of the specific gravity of the bird above the air. If the air, therefore, be so rare as to give way with the same velocity as it is struck withal, there will be no resistance, and consequently the bird can never mount. Birds never fly upwards in a perpendicular line, but always in a parabola. In a direct ascent, the natural and artificial tendency would oppose and destroy each other, so that the progress would be very slow. In a direct descent they would aid one another, so that the fall would be too precipitate.

*Artificial FLYING*, that attempted by men, by the assistance of mechanics.

The art of flying has been attempted by several persons in all ages. The Leucadians, out of superstition, are reported to have had a custom of precipitating a man from a high cliff into the sea, first fixing feathers, variously expanded, round his body, in order to break his fall. Frier Bacon, who lived near five hundred years ago, not only affirms the art of flying possible, but assures us, that he himself knew how to make an engine wherein a man sitting might be able to convey himself through the air, like a bird; and further adds, that there was then one who had tried it with success: but this method, which consisted of a couple of large, thin, hollow copper globes, exhausted of the air, and sustaining a person who sat thereon, Dr. Hook shews to be impracticable. The philosophers of king Charles the second's reign, were mightily busied about this art. The famous bishop Wilkins was so confident of success in it, that he says, he does not question but, in future ages, it will be as usual to hear a man call for his wings, when he is going a journey, as it is now to call for his boots.

**FLYING-ARMY**, a small body under a lieutenant or major general, sent to harass the country, intercept convoys, prevent the enemy's incursions, cover its own garrisons, and keep the enemy in continual alarm.

**FLYING-BRIDGE**. See the article **BRIDGE**.

**FLYING-CAMP**. See the article **CAMP**.

**FLYING-FISH**, a name given by the english writers



writers to several species of fish, which, by means of their long fins, have a method of keeping themselves out of water a long time. See EXOCOETUS, MILVUS, MUGIL-ALATUS, &c.

**FLYING-PINION**, is part of a clock, having a fly, or fan, whereby to gather air, and so bridle the rapidity of the clock's motion, when the weight descends in the striking part. See the article CLOCK.

**FOAL**, or **COLT**, the young of the horse kind. The word colt among the dealers, is understood of the male kind.

Foals are usually foaled about the beginning of summer, and it is the custom to let them run till Michaelmas with the mare, at which time they are to be weaned. Some, however, are of opinion, that a foal is rendered much sooner fit for service by being allowed to suck the whole winter, and weaned about Candlemas or Shrovetide. When first weaned, they must be kept in a convenient house, with a low rack and manger for hay and oats; the hay must be very sweet and fine, especially at first, and a little wheat bran should be mixed with their oats, in order to keep their bodies open, and make them eat and drink freely.

When foals are kept up in the winter, they are not continually to be immured in the stable; but in the middle of the day, when the sun shines warm, they should always be allowed to play about for an hour or two, and when the winter is spent, they should be turned into some dry ground where the grass is sweet and short, and where there is good water, that they may drink at pleasure. The winter after this, they may be kept in the stable without any further care than that which is taken of other horses; but after the first year, the mare foals and horse foals are not to be kept together.

There is no difficulty to know the shape a foal is like to be of; for the same shape he carries at a month, he will carry at six years old, if he be not abused in after keeping. As for his height, it is observed that a large thin bone, long from the knee to the pastern, shews a tall horse; for which another way is to see what space he has between his knee and his withers, which being doubled, it will be his height when he is a full aged horse. There are also means of knowing their goodness; for if they are of stirring spirits, free from frights, wanton of disposition, and very active in leaping and running, and striving for mastery, they

prove generally good mettled horses. It is a good mark also if their hoofs be strong, deep, tough, smooth, upright standing, and hollow. For the manner of breaking them, see the article HORSE.

**FOCAGE**, the same with fire-bote. See the article FIRE-BOTE.

**FOCHEN**, a town of China, capital of the province of Fokien: east long.  $118^{\circ}$ , north lat.  $26^{\circ} 26'$ .

**FOCUS**, in geometry and conic sections, is applied to certain points in the parabola, ellipsis, and hyperbola, where the rays reflected from all parts of these curves concur and meet.

**FOCI of an ellipsis**, are two points in the longest axis, on which as centers the figure is described. See ELLIPSIS.

If from the foci two right lines are drawn, meeting one another in the periphery of the ellipsis, their sum will be always equal to the longest axis; and therefore when an ellipsis and its two axes are given, and the foci are required, you need only take half the longest axis in your compasses, and setting one foot in the end of the shorter, the other foot will cut the longer in the focus required.

**Focus of an hyperbola**, is that point in the axis, through which the latus rectum passes; from whence if any two right lines are drawn meeting in either of the opposite hyperbolas, their difference will be equal to the principal axis. See the article HYPERBOLA.

**Focus of a parabola**, a point in the axis within the figure, distant from the vertex one fourth part of the latus rectum. See the article PARABOLA.

**FOCUS**, in optics, is the point wherein rays are collected, after they have undergone reflection or refraction. See the articles MIRROR and LENS.

**Principal FOCI of a lens**, are the two foci  $F, f$ , (plate CI. fig. 1. n<sup>o</sup> 1.) of rays coming parallel to the axis of the lens, and  $EF$  or  $Ef$  is called its focal distance, and by authors its focal length.

It appears from the laws of optics, as well as from experiments, that the focal distance of a plano-convex, or of a plano-concave glass, is equal to a diameter of its convex or concave surfaces; that is, of the whole sphere it belongs to: secondly, that the focal distance of a double convex or a double concave glass of equal convexities or concavities, is equal to a semi-diameter of either of its surfaces: and consequently that the focal distance of a glass of unequal convexities or un-

equal concavities, will have an intermediate length between a diameter and a semi-diameter of that surface which is most convex or most concave.

*Virtual Focus*, a term used by Mr. Molyneux for that point from which refracted rays begin to diverge. It is also called point of dispersion or divergency.

It is remarkable, 1. That in concave glasses, when a ray falls from air parallel to the axis, the virtual focus by its first refraction, is at the distance of a diameter and a half of the concavity. 2. In plano-concave glasses, when the rays fall parallel to the axis, the virtual focus is distant from the glass the diameter of the concavity. 3. In plano-concave glasses, as 107 to 193, so is the radius of the concavity to the distance of the virtual focus. 4. In double concaves of the same sphere, parallel rays have their virtual focus at the distance of the radius of the concavity. 5. But whether the concavities be equal or unequal, the virtual focus or point of divergency of the parallel rays is determined by this rule. As the sum of the radii of both concavities is to the radius of either concavity, :: so is the double radius of the other concavity : to the distance of the virtual focus. 6. In concave glasses, if the point to which the incident ray converges be distant from the glass farther than the virtual focus of parallel rays, the rule for finding the virtual focus of this ray is this. As the difference of the distance

between this point from the glass, and the distance of the virtual focus from the glass : is to the distance of the virtual focus :: so is the distance of this point of convergence from the glass : to the distance of the virtual focus of this converging ray. 7. In concave glasses, if the point to which the incident ray converges be nigher to the glass than the virtual focus of parallel rays, the rule to find where it crosses the axis is this. As the excess of the virtual focus more than this point of convergence : is to the virtual focus :: so is the distance of this point of convergence from the glass : to the distance of the point where this ray crosses the axis.

*The Focus of incident rays upon a lens being given, to find the Focus of the emergent rays.* Let  $Q$  (*ibid.* n<sup>o</sup> 2.) be the focus of incident rays given, and  $q$  the focus of emergent rays required; draw  $QE$  the axis of the pencil, and with the center  $E$  and semidiameter  $EF$ , equal to the focal distance of the lens, describe an

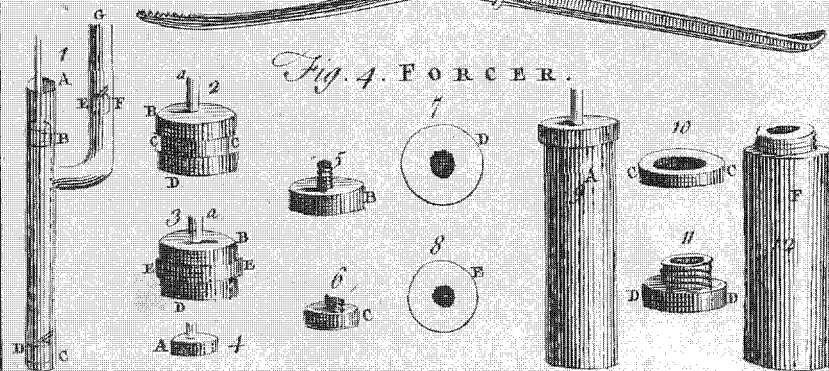
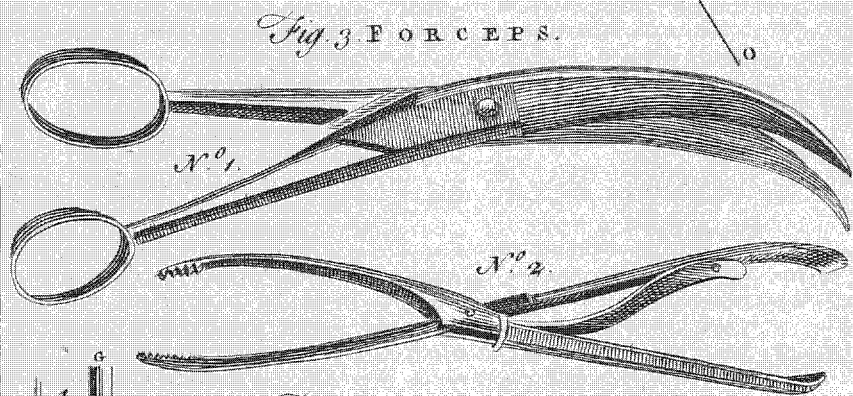
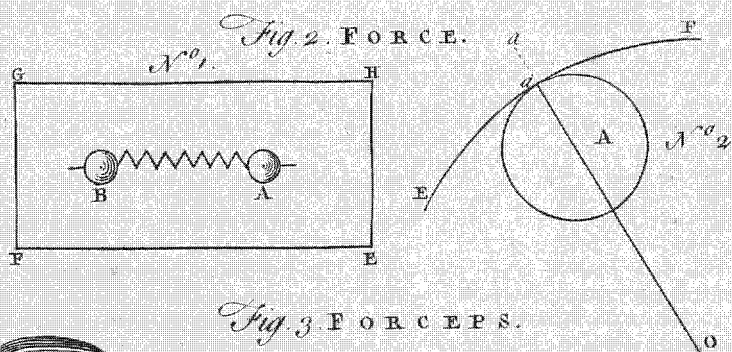
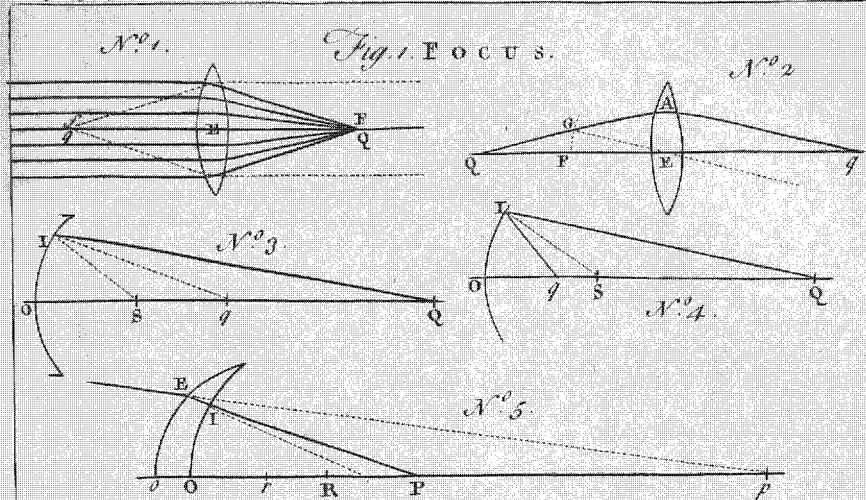
arch  $FG$ , cutting any incident ray  $QA$  in  $G$ ; join  $EG$ , and drawing  $Aq$  parallel to it, the point  $q$ , where it cuts the axis of the pencil, will be the focus of the emergent rays. For supposing other rays, besides  $GA$ , to flow from or towards  $G$ , they will emerge parallel to their axis  $GE$  produced.

*The Focus of rays falling almost perpendicularly upon a given spherical surface being given, to find their focus after refractions.* Let  $OI$  (*ibid.* n<sup>o</sup> 3.) be the given surface, whose center is  $S$ ; and in any radius  $OS$  produced, let  $Q$  be the given focus of the incident rays as  $QI$ , it is required to find the focus  $q$  of the refracted rays. Call  $OS$ ,  $OQ$ ,  $Oq$  respectively  $S$ ,  $Q$ ,  $q$ ; and let the given ratio of the sines of refraction be  $m$  to  $n$ , and let  $m$  be bigger than  $n$ . Then joining  $SI$ , since very small angles are very nearly proportionable to their sines, we have the angle  $OSI$  : to the angle  $SIQ$  ::  $Q$  :  $Q - S$ , and the angle  $SIQ$  : to the angle  $SIq$  ::  $m$  :  $n$ . And by compounding these proportions we have the angle  $OSI$  : to the angle  $SIq$  ::  $mQ$  :  $nQ - nS$ , and disjointly we have the angle  $OSI$  : to the angle  $SqI$ , that is  $q$  :  $S$  ::  $mQ$  :  $m - nQ + nS$ . Whence, putting  $\theta = m - n$ , we have this theorem,  $q =$

$$\frac{mQS}{\theta Q + nS} = \frac{\frac{m}{\theta}SQ}{Q + \frac{n}{\theta}S}. \text{ This is the value}$$

of  $q$  in the given case, where the lines  $OQ$ ,  $OS$ ,  $Oq$  lie all on the same side of the surface  $OI$ ; and thence the theorem for  $q$  may be easily adapted to any other given case, by considering  $OQ$  as being always affirmative, and by changing the sign of  $S$  when  $OS$  and  $OQ$  lie on contrary sides of their origin  $O$ ; and by changing the sign of  $\theta$ , when the sine of incidence is less than the sine of refraction; and, lastly, by placing  $Oq$  the contrary way to  $OQ$ , when the value of  $q$  comes out negative by the theorem so changed.

*Theorem for reflected rays.* Substitute  $-m$  in the preceding theorem for  $n$ , and consequently  $2m$  for  $\theta$ , and we have  $q = \frac{\frac{1}{2}SQ}{Q - \frac{1}{2}S}$ ; which theorem gives the focus of rays reflected from the spherical surface  $OI$ . For the calculation continues the same, whether the rays go forwards or backwards in the line  $Iq$ ; and to change the angle of refraction  $SIq$  (*ibid.* n<sup>o</sup> 3.)





n° 3.) into an angle of reflection, it and its sine  $n$  must be diminished to nothing, and then become negative and equal to  $-m$ , the sine of the angle of incidence *SIQ* (*ibid.* n° 4.)

*Having the Focus of rays falling almost perpendicularly upon a given lens, to find their focus after refractions.* Let *OIEo* (*ibid.* n° 5.) be the given lens, whose vertex's are *O* and *o*; *R* the center of the first surface *OI*; *r* the center of the second *oE*; *P* the given focus of incident rays in the axis *oOrR*; and *p* the focus of the emergent rays required. Let  $\omega$  be their focus after the first refraction at the surface *OI*, and  $m$  to  $n$  the ratio of the sines as above, and call *Oo*, *or*, *OR*, *OP*, *op*, respectively  $a$ ,  $r$ , *R*, *P*,  $p$ . Then for  $Q$ ,  $S$ ,  $m$ ,  $n$ ,  $\theta$  in the foregoing theorem, write *P*, *R*,  $m$ ,  $n$ ,  $\theta$ ; and we have

$$O\omega = \frac{mPR}{\theta P + nR}; \text{ to which adding } Oo,$$

$$\text{or } o, \text{ we have } o\omega \text{ or } \omega = \frac{mPR + \theta Po + nRo}{\theta P + nR}$$

Again, for  $Q$ ,  $S$ ,  $m$ ,  $n$ ,  $\theta$  in the foregoing theorem, write  $\omega$ ,  $r$ ,  $n$ ,  $m$ ,  $-\theta$ ; and

$$\text{we have } p = \frac{nr\omega}{-\theta\omega + nr}; \text{ in which by}$$

$$\text{substituting the value of } \omega, \text{ we have } p = \frac{m\theta P r - m\theta P R + m n R r - \theta\theta P o - n\theta R o}{m n P R r + n\theta P r o + n n R r o}$$

This theorem for a miniscus lens, having its concave surface exposed to *P*, is easily adapted to a lens of any given form, by conceiving one or both its semi-diameters *OR*, *or*, to decrease or increase, or to become infinite and then negative, till the miniscus acquires the form of the given lens; and by changing the sign of *R* or *r*, when the semi-diameters lie on opposite sides of their surfaces *O*, *o*, to the focus *P*; and, lastly, by placing *p* on the opposite side of *o* to *P*, when its value in the theorem so changed comes out negative. Thus by writing  $\infty$  (which denotes infinite) for *R*, this theorem is easily adapted to a plano-convex lens, having its first surface plane; and by writing  $-R$  for *R*, it is adapted to a double convex lens; and by writing  $-R$  for *R*, and  $\infty$  for *r*, it is adapted to a plano-convex lens whose first surface is convex; and by writing  $-R$  for *R*, and  $-r$  for *r*, and  $o+r$  for *R*, it is adapted to a lens of concentric surfaces, whose first surface is convex; and by writing  $R+o$  for *r*, it is adapted to a lens of concentric surfaces whose first surface is concave; and by writing  $\infty$  for *r*, it is adapted to a plano-

concave lens, whose first surface is concave; and by writing  $-r$  for *r*, it is adapted to a double concave; and by writing  $\infty$  for *R*, and  $-r$  for *r*, it is adapted to a plano-concave whose first surface is plane; and, lastly, it is adapted to a sphere whose semi-diameter is *R* and diameter *Oo*, by writing  $-R$  for *R*, and *R* for *r*, and  $2R$  for *o*; and by substituting given numbers for the ratio of refraction, the bigger for  $m$ , and the lesser for  $n$ , it is adapted to lens's of any given substances.

Before the discovery of the law of refraction, according to the given ratio of the sines of incidence and refraction of any given magnitudes, opticians could only consider the refractions of such rays as fell almost perpendicularly upon the refracting surfaces, where the angles of incidence and refraction being but small, were known by experience to be nearly in a given ratio to each other, and these rays they found would all belong to one focus pretty nearly. But Dr. Barrow observing that the several small portions of a large pencil of rays flowing from a given focus, would diverge after refraction or reflection from several different foci, according as they fell with different obliquities upon the several parts of a spherical surface, and being of opinion that the eye receiving a certain small portion of these rays, would judge the object to appear in the place from which they diverged, and consequently to appear in different places according as the eye received a different portion, took occasion from thence to determine these places geometrically by means of the law of refraction, then newly discovered; and consequently to handle the subject of dioptrics and catoptrics, in a more extensive manner than any writer had then done. The foci of rays obliquely refracted and reflected, have also been touched upon by Sir Isaac Newton in his optical lectures, in order to determine the diameters and breadths of the rainbows, and to make way for his admirable theorems concerning the separations of heterogeneous rays. The reader, therefore, desirous of being fully instructed in the determinations of the foci of rays falling with any degrees of obliquity upon any number of reflecting and refracting surfaces of any sort, may consult the above-mentioned writers, as also Dr. Smith's optics, book 2. ch. 9. and the remarks on that chapter, where the chief discoveries of Sir Isaac and Dr.

Barrow are not only comprehended, but made much more general, by shewing that the relation of the focus's of incident and emergent rays, to the focus's of parallel rays coming contrary ways is always the same, after any number of oblique refractions or reflections, as when a pencil of rays is but once refracted or reflected at the vertex of a single surface.

**FODDER**, any kind of meat for horses, or other cattle. In some places, hay and straw, mingled together, is peculiarly denominated fodder.

**FODDER**, in the civil law, is used for a prerogative that the prince has, to be provided of corn and other meats for his horses, by the subjects, in his warlike expeditions.

**FODDER**, in mining, a measure containing twenty-two hundred and an half weight, though in London but twenty hundred weight.

**FODINA**, in anatomy, the labyrinth of the ear. See the article **EAR**.

**FOECES** and **FOECULA**. See the articles **FÆCES** and **FÆCULA**.

**FOECIALES**, or **FECIALES**, in roman antiquity. See the article **FECIALES**.

**FOECUNDITY**, or **FECUNDITY**, the same with fertility. See **FERTILITY**.

**FOENICULUM**, *fennel*, in botany, agrees in characters with anethum or dill. See the articles **DILL** and **FENNEL**.

**FOENUGREEK**, *fenum graecum*, in botany, is called by Linnæus *trigonella*. See the article **TRIGONELLA**.

The figure of foenugreek-feed is singular, being irregularly rhomboidal, considerably thick, with a line or depression running obliquely from one of the opposite angles to the other. It is of a pale-yellowish colour, and of an extremely tough and firm texture. It is of a strong and agreeable smell, and of a faint nauseous taste. We have it from Germany.

Fœnugreek is used externally on many occasions by way of cataplasm or fomentation; being emollient and discutient in a great degree, and found to give great relief in pains, bruises, &c. It is sometimes also an ingredient in emollient clysters, where anodynes and carminatives are required, without too much pungency. It is also an ingredient in the ointment of marsh-mallows, and some other shop-compositions; but is never given internally.

**FOETOR**, in medicine, stinking or foetid effluvia, arising from the body, or any part thereof.

**FOETOR NARIUM**, a foetid stench of the nostrils, arising from a deep ulcer within the nose, the cause of which, according to Galen, is a sharp humour falling from the brain upon the mamillary processes. See the article **ULCER**.

This is one of the causes for which marriage might, in former times, be annulled.

**FOETOR ORIS**, a term used by medical writers to express that bad smell in the mouth, usually, tho' often improperly, called a stinking breath.

This is a malady arising in different cases from very different causes, as from the scurvy, and particularly from that species of it which affects the mouth, and is therefore called stomocace; from the french pox; from an ulceration, whether simple or fistulous, in the lungs, which is the case in consumptions; from ulcers in the mouth; from a caries or rottenness of the teeth, or from any other impurity of them; from crudities in the stomach, arising from a bad digestion; and particularly from a weakness about the left orifice of the stomach, from which part of the foetid vapour will often arise in very great abundance.

According to the different causes of this disorder, it requires a very different method of cure; in cases where it depends on the scurvy, pox, or other diseases, then those diseases are to be attacked by the proper medicines. See **SCURVY**, **POX**, &c.

When it arises from a carious tooth, there is no other cure for it but drawing the tooth. When the impurities of the teeth occasion it, the cleaning them proves a cure.

**FOETUS**, in physiology, denotes the child while it is contained in the mother's womb, but particularly after it is formed, till which time it is more properly called embryo. See the article **GENERATION**.

*Formation of a FOETUS*. The formation of the bones in a foetus, is very gradual and regularly performed. In the first two months, there is nothing of a bony nature in the whole. After this, the hardness of the parts, where the principal bones are to be situated, becomes, by degrees, perceptible. Dr. Keiskring describes the progress of the ossification from skeletons, which he had prepared from foetuses of two months, and thence up to nine. In the first two months, or to the end of that time, there appears not any thing bony. After this, in the third and

fourth

fourth months, the several parts, one after another, acquire their bony nature. In the first stages, every thing is membranous, where the bones are to be: these, by degrees, transigrate into cartilages, and from these, by the same sort of change continued, the bones themselves are by degrees formed. All this is done by nature, by such slow, though such certain progressions, that the nicest eye can never see it doing, though it easily sees it when done.

Fœtuses increase proportionably less, the longer they continue in the womb. Mauriceau pretends, that the increase of a fœtus is sixty-four times its own weight in triple the time. Thus, he says, that, at the birth, a child weighs twelve pounds, of sixteen ounces each; at the three months, it weighs three ounces; at one month,  $\frac{3}{8}$  of a drachm; and at ten days, less than half a grain.

*Anatomy of a Fœtus.* In the examination of the fœtus intire, we first observe the membranes surrounding it in the uterus, as in an egg, the exterior of these is the chorion; the interior, or second membrane, is the amnios; and a third, tho' its existence is disputed in human subjects, is the allantois. See the articles CHORION, AMNIOS, and ALLANTOIS.

After the membranes including the fœtus, we are next to examine the placenta, the number of which, in human subjects, answers to that of the fœtuses. See the article PLACENTA.

After the placenta, we are to observe the umbilical vessels of the fœtus, which, after the birth, degenerates into ligaments. See UMBILICAL and ARTERY.

Another part belonging to the umbilical vessels observable in the human fœtus, is the funiculus umbilicalis, or navel-string. See the article NAVEL-STRING.

The more essential differences between the human fœtus and an adult, considering the fœtus not only as yet enclosed within the womb, but as newly come from it, are as follows.

In the abdomen, the umbilical vein and arteries of the navel, and the canalis vefosus in the liver, are in the fœtus open and pervious; in adults, they are contracted and solid. The liver is very large, the stomach is filled with a glutinous fluid, and the larger intestines, and often the ilium also, with the fœces called meconium. The renes succenturiati, are larger in the fœtus than in adults. The kidneys themselves are not smooth and

even on the surface, as in adults, but unequal, and in some measure resembling those of a calf. The urinary bladder is of a longer shape, and extends almost to the navel. The hymen in a female fœtus, is very plain and obvious. In the thorax, besides a peculiar fluid, found as well in this cavity as in the abdomen, the gland thymus is larger than it is in adults. The lungs, as they have never yet been inflated by breathing, are collapsed, and of a blackish colour; and if thrown into water they sink in it, contrary to what is the case in those in adults. In the heart, the foramen ovale between the left and right auricle, and the canalis arteriosus, between the pulmonary artery and the aorta, are open, to serve for a peculiar circulation in the fœtus, which has not yet breathed; and there is in the inferior trunk of the vena cava, near the heart, a remarkable valve, called by Cheselden in his anatomy, *valvula nobilis*. See the article VALVE.

In the head, besides its great size in proportion to the body, we are to observe, that the ossa cranii are in several places distant from one another, especially at the fontanella; and that the sutures are wanting. The brain also is softer than in adults. The teeth are also imperfect, and not rooted in the gums; they lie hid or buried under the gums, to appear at a more advanced period. The meatus auditorius is not yet perfect in them; and in the fœtus, whilst it is in the womb, is entirely closed up by a peculiar membrane, which is continuous with the epidermis, and which naturally disappears after delivery. The bones of the whole body, excepting only a very few, are either soft or yet absolutely imperfect: some of them are merely cartilaginous, and the articulations are not at that time perfected.

*Situation of the Fœtus in the womb.*

This, in the first months, and even in the middle ones, is perfectly uncertain; but in the latter months, it is more regular; in these it is usually in a posture like that of sitting, and its head and neck are bent downwards; its knees are raised up towards its cheeks; and its heels drawn up to its buttocks. Its hands are usually hanging down, and embrace the feet. A little time before the delivery, it usually changes its position, in such a manner, that its head falls towards the mouth of the womb, and its buttocks and feet are turned upwards. Frequently, however,

it varies during the whole time of the pregnancy from the common rule, and at the very instant of the delivery, its head does not present itself, but is turned to one side, or to some other part of the womb.

For the exclusion of the foetus from the uterus, see the article DELIVERY.

*Nutrition of the FOETUS.* How the nutrition of the foetus is performed, is disputed among the learned. Heister is of opinion, that the nutrition of the foetus, during the first months, while the organs of concoction is not yet formed, is probably effected by means of the navel-string alone. But in the more advanced state of the foetus, in the latter months, that great anatomist supposes, that it is also nourished by the mouth, by means of a soft and somewhat glutinous fluid that surrounds it, and which is probably secreted from the amnios. In support of this opinion he observes, 1. That a fluid similar to that of the amnios, is found in the mouth, the œsophagus, and the stomach, not only of the human foetus, but in that of quadrupeds. 2. That this fluid is also found in the small guts of the foetus, but altered and digested. 3. That there are also found in the larger intestines real fæces, called meconium: sometimes the whole ilium is full of these. 4. That in the first months, there is a great quantity of this fluid surrounding the foetus; but in the latter months, there is but very little of it, and the consumption of it is not easily accounted for any other way, than by its being swallowed by the foetus. 5. That the liquid itself is so extremely proper for the nutrition of the foetus, that a more fit one could not have been formed or desired. 6. That it seems to be continually pressed into the mouth, œsophagus, and stomach of the foetus, by the perpetual renitency of the uterus itself, and by the pressure of the muscles of the abdomen, and of the ambient air.

Mr. Gibson, in the Medical Essays of Edinburgh, has lately adopted this opinion as the most probable. Hippocrates, among the antients, was of opinion, that the foetus was nourished both by the mouth and by the umbilical vessels. He maintains, that the child, in the womb, with its lips compressed together, attracts nourishment; for which he assigns this reason, that, unless the child had sucked in utero, it neither could deposit excre-

ment, nor know how to suck so soon as it was born.

On the other hand, Dr. Monro, of Edinburgh, is of opinion, that the foetus in viviparous animals, is nourished by the navel alone. He has given a curious dissertation on this subject in the Medical Essays, where he observes, 1. That the foetus is capable of receiving its whole nourishment by the umbilical vein alone, whereas no foetus can subsist without the umbilical vessels. 2. That the liquor of the amnios is ill calculated in its natural state for the food of a foetus, and becomes altogether unfit food in morbid cases. 3. That it is highly improbable, that a creature should furnish its subsistence out of its own body, which must be the case, if the foetus feeds on the liquor of the amnios. 4. That it cannot be inferred from any resemblance of the liquor of the stomach and amnios, nor from any other appearances, that the liquor of the amnios is ever sent down into the stomach. 5. That no direct proof can be had of the liquor of the amnios being pressed or swallowed down, but, on the contrary, all circumstances make it probable, that it does not go down. 6. That all the phenomena of a foetus can most reasonably be accounted for, without supposing the liquor of the amnios to be any part of its food: hence he thinks it reasonable to exclude the mouth from the office of conveying the aliment of the foetuses of viviparous animals, and to believe that all their nourishment is conveyed by the vessels. See Medical Essays, vol. II. page 102, *seq.*

Dr. Monro has, in these essays, given several other curious observations relating to the question about the nutrition of foetuses of viviparous animals: he has also considered the nourishment of plants in a foetus-state, and shewn the analogy there is between these and the animal-foetuses. To fix the analogy between animals and plants, he observes that the former may be said to remain in the state of a foetus, so long as the young creature is solely nourished by liquors furnished by the uterus of the parent; and plants are to be considered as foetuses only, while the seed is ripening, and before the earth, water, moisture of the air, &c. have communicated immediately any matter for its increase. Medical Essays, vol. II. page 201. *seq.*

To the question, Whence foetuses have their



their red blood? Dr. Monro answers, that fœtuses in viviparous animals, have their red blood from the same source that chickens in the egg have theirs, which can be no other than the action of their heart, and of the vessels in their body and secundines.

While fœtuses continue in the womb, their muscles commonly act by their natural contraction, or the fœtus is said to be in a state of sleeping: but sometimes, when its ease or preservation requires a change of situation, it seems to perform some voluntary motions which are called stirrings. The human fœtus is generally supposed to be animated about the end of the sixth, or beginning of the seventh week after conception; though it is seldom felt to stir, till towards the middle of the time of gestation.

Respiration seems to be the great act by which the change is made in animals, from the state of fœtus, to that of motion, sensation, and the other qualities of animal life in their larger degree. Mr. Duverney observed this in the fœtus of a common snake: he broke the egg of one of these animals, at a time when it was just ready for hatching, and the young snake fell out, rolled in a spiral, at first quite stiff and motionless; but it had no sooner breathed three or four times, than it began to perform all the motions of animal life, in the most nimble and active manner. See the article **RESPIRATION**.

Hippocrates and some learned modern physicians suppose, that a fœtus respire in the womb; but it seems very difficult to conceive how air should traverse the body of the mother, and the teguments of the child; and since nature hath in new-born infants contrived peculiar temporary vessels, that the blood may circulate through other passages than it does in the same individuals, when they come to have the free use of their lungs, it is improbable that the fœtus in the womb should properly respire.

The symptoms of the human fœtus being dead in the womb, the reasons which may occasion it, the accidents which attend it, and the methods of preventing it, and remedying the consequences thereof, as also the various ways of expelling it, may be seen under the articles **ABORTION**, **CONCEPTION**, **DELIVERY**, &c.

For the circulation of the blood, as performed in the fœtus, see **CIRCULATION**.

**FOG**, or **MIST**, a meteor consisting of

gross vapours, floating near the surface of the earth.

Mists, according to lord Bacon, are imperfect condensations of the air, consisting of a large proportion of the air, and a small one of the aqueous vapour; and these happen in the winter, about the change of the weather, from frost to thaw, or from thaw to frost: but in the summer and the spring, from the expansion of the dew.

If the vapours, which are raised plentifully from the earth and waters, either by the solar or subterraneous heat, do, at their first entrance into the atmosphere, meet with cold enough to condense them to a considerable degree, their specific gravity is, by that means, increased; and so they will be stopped from ascending, and return back, either in form of dew, or drizzling rain; or remain suspended some time in the form of a fog. Vapours may be seen on the high grounds as well as the low, but more especially about marshy places: they are easily dissipated by the wind, as also by the heat of the sun: they continue longest in the lowest grounds, because these places contain most moisture, and are least exposed to the action of the wind.

Hence we may easily conceive, that fogs are only low clouds, or clouds in the lowest region of the air; as clouds are no other than fogs, raised on high. See **CLOUD**.

When fogs stink, then the vapours are mixt with sulphureous exhalations, which smell so. Objects viewed through fogs, appear larger and more remote than through the common air. Mr. Boyle observes, that upon the coast of Coromandel, and the most maritime parts of the East-Indies, there are, notwithstanding the heat of the climate, annual fogs so thick, as to occasion those of other nations who reside there, and even the more tender part of the natives, to keep their houses close shut up.

**FOGAGE**, in the forest law, is rank grass not eaten up in summer.

**FOGARES**, a town of Transilvania, thirty miles north-east of Hermanstadt.

**FOGO**, one of the Cape-Verd-islands, subject to Portugal.

**FOIL**, among glass-grinders, a sheet of tin, with quicksilver or the like, laid on the backside of a looking-glass, to make it reflect. See the articles **FOLIATING** and **LOOKING-GLASS**.

**FOIL**, among jewellers, a thin leaf of metal placed under a precious stone, in order to make it look transparent, and give

it an agreeable different colour, either deep or pale : thus, if you want a stone to be of a pale colour, put a foil of that colour under it ; or if you would have it deep, lay a dark one under it.

These foils are made either of copper, gold, or gold and silver together : the copper foils are commonly known by the name of nuremberg or german foils ; they are prepared as follows : procure the thinest copper-plates you can get ; beat these plates gently upon a well polished anvil, with a polished hammer, as thin as possible ; and placing them between two iron-plates as thin as writing-paper, heat them in the fire ; then boil the foils, in a pipkin, with equal quantities of tartar and salt, constantly stirring them till by boiling they become white ; after which, taking them out, and drying them, give them another hammering, till they are made fit for your purpose : however, care must be taken not to give the foils too much heat, for fear of melting, nor must they be too long boiled, for fear of attracting too much salt.

The manner of polishing these foils is as follows : take a plate of the best copper, one foot long and about five or six inches wide, polished to the greatest perfection ; bend this to a long convex, fasten it upon a half roll, and fix it to a bench or table ; then take some chalk, washed as clean as possible, and sifted through a fine linnen-cloth, till it be as fine as you can make it ; and having laid some thereof on the roll, and wetted the copper all over, lay your foils upon it, and with a polishing stone and the chalk, polish your foils till they are as bright as a looking glass ; after which they must be dried, and laid up secure from dust.

**FOILING**, among huntsmen, the footing and treading of a deer, that is on the grass and scarce visible.

**FOLCLAND** and **FOLCMOTE**. See the articles **FOLKLAND** and **FOLKMOTE**.

**FOLD-NET**, among sportsmen, a sort of net with which small birds are taken in the night, of which there are two sorts ; the least may be managed by one man only, but the greatest must be carried by two, and used thus : let the net be fixed on both sides to two strong, straight, and light poles about twelve feet long, each man holding one of them ; let there be one behind them, at the distance of two yards, to carry lights : the nets must be carried between the wind and the birds, which all naturally roost on their perches with their

breasts against the wind ; by reason of this, he that beats the bushes on the other side of the hedge, will drive them out that way towards the light.

**FOLDAGE**, the liberty of penning sheep by night. See the article **FALDAGE**.

**FOLDING** of *sheep*. In some places they fet their fold with several partitions, and put the widders, ewes, and lambs separate by themselves. It is not good to fold them in rainy weather : and, as it is the opinion of some husbandmen that urine of sheep heats, helps, and comforts the land as much or rather more than their dung does, they cause all the sheep in the fold to be raised before they let them go out, and go about the sides of the fold with a dog ; for commonly when sheep see a dog come nigh them, they will dung and stale.

**FOLIA**, among botanists, particularly signify the leaves of plants ; those of flowers being expressed by the word petal. See the article **PETAL**.

**FOLIACEUM EXPANSUM**, in anatomy, a term applied to the extreme part of the fallopian tube, nex the ovary, which is expanded like the mouth of a trumpet, and surrounded with a sort of fringe. See the article **FALLOPIAN TUBE**.

**FOLIAGE**, a cluster or assemblage of flowers, leaves, branches, &c.

**FOLIAGE** is particularly used for the representations of such flowers, leaves, branches, rings, &c. whether natural or artificial, as are used for enrichments on capitals, friezes, pediments, &c.

**FOLIATE**, in the higher geometry, a name given by Mr. de Moivre to a curve of the second order, expressed by the equation  $x^3 + y^3 = axy$  ; being a species of defective hyperbolas with one asymptote, and consisting of two infinite legs crossing one another, and forming a sort of leaf.

**FOLIATING** of *looking-glasses*, the spreading the plates over, after they are polished, with quicksilver, &c. in order to reflect the image. It is performed thus : a thin blotting paper is spread on the table, and sprinkled with fine chalk ; and then a fine lamina or leaf of tin, called foil, is laid over the paper ; upon this mercury is poured, which is to be distributed equally over the leaf with a hare's foot, or cotton : over this is laid a clean paper, and over that the glass-plate, which is pressed down with the right-hand, and the paper drawn gently out with the left : this being done, the plate is covered with a thicker paper, and loaded with a greater weight,

weight, that the superfluous mercury may be driven out, and the tin adhere more closely to the glass. When it is dried, the weight is removed, and the looking-glass is complete.

Some add an ounce of marcasite, melted by the fire; and, lest the mercury should evaporate in smoke, pour it into cold water; and when cooled, squeeze through a cloth, or through leather.

Some add a quarter of an ounce of tin and lead to the marcasite, that the glass may dry the sooner.

**FOLIATING of globe looking-glasses**, is done as follows: take five ounces of quicksilver, and one ounce of bismuth; of lead and tin, half an ounce each: first put the lead and tin into fusion, then put in the bismuth, and when you perceive that in fusion too, let it stand till it is almost cold, and pour the quicksilver into it: after this, take the glass-globe, which must be very clean, and the inside free from dust; make a paper-funnel, which put into the hole of the globe, as near to the glass as you can, so that the amalgam, when you pour it in, may not splash, and cause the glass to be full of spots; pour it in gently, and move it about, so that the amalgam may touch every where. If you find the amalgam begin to be curdly and fixed, then hold it over a gentle fire, and it will easily flow again. And if you find the amalgam too thin, add a little more lead, tin, and bismuth to it. The finer and clearer your globe is, the better will the looking-glass be.

Dr. Shaw observes, that this operation has considerable advantages, as being performable in the cold, and that it is not attended with the danger of poisonous fumes from arsenic, or other unwholesome matters, usually employed for this purpose: besides, how far it is applicable to the more commodious foliating of the common looking-glasses, and other speculums, he thinks, may deserve to be considered.

**FOLIATION**, a term used by some botanists to denote the corolla, or flower-leaves. See **FLOWER** and **COROLLA**.

**FOLIGNO**, or **FULIGNO**. See **FULIGNO**.

**FOLIO**, in merchants books, denotes a page, or rather both the right and left hand pages, these being expressed by the same figure, and corresponding to each other. See **BOOK**.

**FOLIO**, among printers and booksellers, the largest form of books, when each sheet is

so printed, that it may be bound up in two leaves only.

This form is only used in large works; and even, in these, the quarto or octavo forms are much more handy.

**FOLIUM**, **LEAF**, among botanists. See the article **LEAF**.

**FOLIUM INDICUM**, **INDIAN LEAF**, in the materia medica, is an oblong, smooth, and pointed leaf, of a grateful smell. They agree in virtues with spikenard, and are to be chosen fresh and greenish. They are the produce of a species of cinnamon. See the article **CINNAMON**.

**FOLIUM BRANCHIARUM**, among ichthyologists, the leaf of the gills. See **GILLS**.

**FOLKLAND**, in ancient law-writers, the same with copyhold. See **COPYHOLD**.

**FOLKMOTE**, or **FOLCMOTE**, according to Kennet, was the common-council of all the inhabitants of a city, town, or borough: though Spelman will have the folkmore to have been a sort of annual parliament or convention of the bishops, thanes, aldermen, and freemen on every May-day. Dr. Brady, on the contrary, tells us, that it was an inferior court, held before the king's reeve, or his steward, every month, to do folk right.

**FOLKSTONE**, a market-town of Kent, six miles west of Dover.

**FOLLICLE**, *folliculus*, among botanists, denotes a kind of seed-vessel, like the conceptaculum. See **CONCEPTACULUM**.

**FOLLICULUS FELLIS**, the **GALL-BLADDER**. See the article **GALL-BLADDER**.

**FOMAHANT**, in astronomy, a star of the first magnitude, in the constellation aquarius. See the article **AQUARIUS**.

**FOMENTATION**, in medicine, the bathing any part of the body with a convenient liquor; which is usually a decoction of herbs, water, wine, or milk; and the applying of bags stuffed with herbs and other ingredients, which is commonly called dry fomentation.

Fomentations differ in little else from embrocations, but that they are mostly made with aqueous menstrua, are more extensive in their manner of application, and are assisted by actual heat, and hot woollen cloths: add to this, that fomentations, when general, or applied to every part of the body, are called baths. See the article **BATH** and **EMBROCATION**.

According to some, a fomentation is only a liquid epitherm, applied hot. See the article **EPITHERM**.

Fomentations are to be looked on as partial bathings, applied only to a diseased

part, on which they have much the same effect as bathing has on the whole body. See the article BATHING.

FONCEAU, in the manege, the same with chaperon. See CHAPERON.

FONDI, a city and bishop's see of Naples, in the province of Lavoro, about thirty-five miles north-west of Capua: east long.  $14^{\circ} 20'$ , and north lat.  $41^{\circ} 35'$ .

FONT, among ecclesiastical writers, a large basin, in which water is kept for the baptizing of infants, or other persons. It is so called probably because baptism was usually performed among the primitive christians at springs or fountains. In process of time the font came to be used, being placed at the lower end of the church, to intimate, perhaps, that baptism is the rite of admission into the christian church.

By the canons of the church of England, every church is to have a font made of stone; because, says Durandus, the water which typified baptism in the wilderness, flowed from a rock; or rather, because Christ is in scripture called the corner-stone, and the rock. See BAPTISM.

FONT, or FOUNT, among printers. See the article FOUNT.

FONTAINE, a town of Hainalt, fifteen miles east of Mons.

FONTAINEBLEAU, a village of the isle of France, about thirty miles south-east of Paris; remarkable for an elegant royal palace.

FONTANELLA, in anatomy, the quadrangular aperture, between the os frontis and ossa sincipitis, in infants just born, which is also called fons pufatilis.

FONTANELLA, in surgery, the same with fonticulus. See FONTICULUS.

FONTARABIA, a port-town of Spain, in the province of Biscay, twenty miles west of Bayonne: west lon.  $1^{\circ} 35'$ , and north lat.  $43^{\circ} 20'$ .

FONTENAYLE, a town of Orleans, in France, about forty-six miles west of Poitiers.

FONTENOY, a town of Hainalt, situated three miles south-east of Tournay.

FONTEVRAUD, or Order of FONTEVRAUD, a religious order instituted about the latter end of the XIth century. By the rules of this order the nuns were to keep silence for ever, and their faces to be always covered with their veils; and the monks wore a leathern girdle, at which hung a knife and sheath.

FONTICULUS, or FONTANELLA, in surgery, an issue, seton, or small ulcer made

in various parts of the body, in order to to eliminate the latent corruption out of it. See ISSUE, SETON, &c.

FONTALIALIA, in roman antiquity, a religious feast celebrated on October 13, in honour of the nymphs of wells and fountains. The ceremony consisted in throwing nosegays into the fountains, and putting crowns of flowers upon the wells. Scaliger, however, in his conjectures upon Varro, takes this not to have been a feast in honour of fountains in general, but of the fountain which had a temple at Rome, near the Porta Capena, called from thence Porta Fontinalis.

FONTALIS, in botany, a genus of the *cryptogamia* class of mosses; the male flower is almost sessile in the axæ of the leaves; the anthera is roundish, with an open mouth, and covered with calyptræ.

FOOD implies whatever aliments are taken into the body, to nourish it. See DIET, DRINK, ALIMENT, &c.

As the health of the human body evidently depends upon the quantity and quality of the blood and juices, it is plain that all those aliments which preserve and maintain a just temperament and a due quantity of these are beneficial to health; and that such as have a contrary tendency are to be reckoned unwholesome. As to the nature of food with respect to mankind in general, some is of a good juice, and some of a bad juice; the first generates pure blood; the other bile, or an atrabilious humour. Moreover, some sorts of food are easy of concoction, others difficult: some loosen the belly, others bind it: and every sort is said to be endowed with some peculiar virtue or property, the reasons of which are founded in nature.

As the blood, the nutritive juice, and in general all the parts of the body are made up of three elements, *viz.* of one which is sulphureous, oily, and inflammable; of one of an earthy, subtle, alkaline nature; and of one of an aqueous nature: so the several kinds and virtues of food may be most commodiously reduced to these three classes; and aliments of these three several qualities, duly mixed with one another, afford a proper nourishment for the human body.

The flesh of animals, especially when roasted, affords the body its principal supply of the sulphureous part; but it is to be observed, that wild animals are preferable in this respect to the tame and domestic kind, because their oils and salts

are exalted by habitual exercise. Among the aliments which furnish the blood with its humid parts, of animals, fish; and of vegetables, pot-herbs, the milder roots, and some summer-fruits are reckoned the principal. To the third class, which supplies the blood with its fixed and earthy parts, belong all kinds of grains, as the several sorts of bread, rice, peas, beans, lentils, chestnuts, almonds, cacao, cheese, &c. From what has been said, it will appear that all such aliments as are of a mild quality, and resemble the chyle and blood, are fit for nourishment; that all such food as either recedes from, or is quite opposite to the nature of the chyle and blood, is unfit for nourishing the parts; that all food in which there is too much of an acid, is improper for nourishment, because milk and blood will not mix with an acid, which is quite opposite to their natures, and induces a coagulation of the circulating juices; that all salts, and all foods too highly salted, must be unfit for nourishment, because no salt whatever can be mixed with the blood, chyle, and milk; and lastly, that the free use of spirits must be very detrimental both to health and nourishment, because blood and chyle never incorporate with spirituous liquors, but rather separate from them.

Foods proper for preserving health ought not only to contain a laudable juice, but should likewise be easily dissolved by the stomach: hence it is plain, that all those kinds of food, which on account of the closeness and compactness of their texture, are with difficulty dissolved, are for that very reason less conducive to health. Again, as it is necessary to the performance of the office of nutrition, that the small mouths of the internal rough coat of the intestines absorb the chyle, and convey it to the blood, none of those foods which either obstruct or too much corrugate its mouths, can be used, without in some measure injuring health. And as the effects of foods, drained and exhausted by the separation of the chyle from it, ought by the expansive and contractive motion of the intestines, to be thrown off from them; it must of course follow, that all those foods are prejudicial to health, which either pass through the intestines with difficulty, stop their motions, or weaken their tone and impair their strength by suppressing excretion, so necessary to health. This characteristic of unwholesomeness belongs to all astringent, mouldy,

glutinous, viscid, austere foods, to all unripe summer-fruits, and in general to all such aliments as are easily reducible to a firm coagulum, which, by adhering immovably to the coats of the intestines, and incrustating the orifices of their small absorbent vessels, occasion copious flatulencies and spasms. The unwholesomeness of foods is also to be estimated from their impairing the fermentative and solutive powers of the stomach, since by that means crudities are generated. Upon the whole, however, it must be observed, that for different intentions, different kinds of foods are required, in which age, constitution, climate, season of the year, and numberless other considerations are to be included; and that abstinence and exercise must conduce with every kind of food, for the preservation of health; and that where exercise is wanting, as in studious persons, the defect must be supplied with abstinence.

The quantity of food also must vary according to age, season, constitution, and nature of the food itself. Some physicians say, that in winter, where the perspiration of an unexercised person is only equal to the urine, the food for twenty-four hours ought not to exceed four pounds, or four pounds and a half. In summer, the food may be six pounds and an half, which may be carried off without the help of exercise, when the air is hot and dry. Dr. Bryan Robinson thinks, that if the quantity of food be such as to make the perspiration and urine of a natural day always nearly equal, and the morning-weight of the body always nearly the same, that quantity is the truly healthful quantity of food for grown persons who use but little exercise. The same author thinks, that the quantity of food necessary to keep a grown body in health, will be better and more easily digested, when it is so divided as to make the meals equal, than when they are very unequal: that good and constant health consists in a just quantity of food, and a just proportion of the meat to the drink; and that to be freed from chronical disorders contracted by intemperance, the quantity of food ought to be lessened, and the proportion of the meat to the drink increased more or less, according to the greatness of the disorders.

**FOOL**, according to Mr. Locke, is a person who makes false conclusions from right principles; whereas a madman, on the contrary, draws right conclusions from wrong

wrong principles. See REASON and UNDERSTANDING.

FOOL'S STONES, in botany, a name given to the orchis. See ORCHIS.

FOOT, *pes*, a part of the body of most animals whereon they stand, walk, &c. Animals are distinguished, with respect to the number of their feet, into *bipedes*, two-footed; such are men and birds: *quadripedes*, four-footed; such are most land-animals: and *multipedes*, or many-footed, as insects. The reptile-kind, as serpents, &c. have no feet; the crab-kind of fish have got ten feet, but most other fishes have no feet at all: the spider, mites, and polypuses have eight; flies, grasshoppers, and butterflies have six feet. Animals destined to swim, and water-fowl, have their toes webbed together, as the phocæ, goose, duck, &c. The fore-feet of the mole, rabbit, &c. are wonderfully formed for digging and scratching up the earth, in order to make way for their head.

FOOT, in anatomy. The greater foot denotes the extent from the juncture of the hip to the toe-ends, and is divided into the thigh, the leg, and the foot, properly so called. See THIGH and LEG. The lesser foot, or that properly so called, is divided into four parts, *viz.* the tarsus, the metatarsus, the toes, and the ossa sesamoidea. See the articles TARSUS, METATARSUS, TOE, and SESAMOIDE BONES.

In examining the foot, we are to consider its length, which is greater in man than in any other animal, in order to serve for his treading the firmer. It is also to be remarked, that the under part, or sole, called *planta*, is contrived hollow in man, lest the vessels should be pressed on in walking, as we press there with our whole weight, whilst we are in this posture. See the article PLANTA.

FOOT, in the latin and greek poetry, a metre or measure, composed of a certain number of long and short syllables.

These feet are commonly reckoned twenty-eight, of which some are simple, as consisting of two or three syllables, and therefore called disyllabic or trisyllabic feet; others are compound, consisting of four syllables, and are therefore called tetrasyllabic feet.

The disyllabic feet are four in number, *viz.* the pyrrhichius, spondeus, iambus, and trocheus. See PYRRHICHIVS, &c. The trisyllabic feet are eight in number, *viz.* the dactylus, anapæstus, tribra-

chys, molossus, amphibrachys, amphi-macer, bacchius, and antibacchius. See DACTYL, &c.

The tetrasyllabic are in number sixteen, *viz.* the procleusmaticus, dispondeus, coriambus, antispastus, diiambus, dichoreus, ionicus a majore, ionicus a minore, epitritus primus, epitritus secundus, epitritus tertius, epitritus quartus, pæon primus, pæon secundus, pæon tertius, and pæon quartus. See the articles PROCLEUSMATICUS, &c.

There are several other sorts of feet invented by idle grammarians, of five, six, or more syllables, but they are not worth the reciting. The number of feet each sort of verse contains, will be found under that particular verse. See the articles HEXAMETER, &c.

Even and odd FOOT, in poetry, is a foot so denominated in respect of its situation in the verse: thus, the first, third, and fifth foot of the verse are uneven. This denomination of feet chiefly obtains in iambic verse. See IAMBIC.

FOOT is also a long measure, consisting of 12 inches. See the article INCH.

Geometricians divide the foot into 10 digits, and the digit into 10 lines. See the articles DIGIT and LINE.

FOOT square, is the same measure, both in breadth and length, containing 144 square or superficial inches.

Cubic, or Solid FOOT, is the same measure in all the three dimensions, length, breadth, and depth or thickness, containing 1728 cubic inches.

The foot is of different lengths in different countries. The paris royal foot exceeds the english by nine lines; the antient roman foot of the Capitol, consisted of 4 palms, equal to  $11\frac{7}{16}$  inches english; rhineland or leyden foot, by which the northern nations go, is to the roman foot as 950 to 1000. The proportions of the principal feet of several nations, compared with the english, are as follow.

The english foot being divided into 1000 parts, or into 12 inches, the other feet will be as follow:

		1000 parts.	Feet. inch.	lines.
London-foot	—	1000	0 12	0
Amsterdam	—	942	0 11	3
Antwerp	—	946	0 11	2
Bologna	—	1204	1 2	4
Bremen	—	964	0 11	6
Cologne	—	954	0 11	4
Copenhagen	—	965	0 11	6

Dantzick

	1000 parts.	Feet.	inch.	lines.
Dantzick-foot —	944	0	11	3
Dort —	1184	1	2	2
Frankfort on the Main	948	0	11	4
The Greek —	1007	1	0	1
Lorrain —	958	0	11	4
Mantua —	1569	1	6	8
Mechlin —	919	0	11	0
Middleburg —	991	0	11	9
Paris royal —	1068	1	0	9
Prague —	1026	1	0	3
Rhineland or Leyden	1033	1	0	4
Riga —	1831	1	9	9
Roman —	967	0	11	6
Old Roman —	970	0	11	8
Scotch —	1005	1	0	5
Strasburg —	920	0	11	0
Toledo —	899	0	10	7
Turin —	1062	1	0	7
Venice —	1162	1	1	9

**FOOT of a horse**, in the manege, the extremity of the leg, from the coronet to the lower part of the hoof.

The four feet of a horse are distinguished by four different names: the far fore-foot denotes the right foot before; and the near fore-foot, the stirrup-foot, and the bridle-hand-foot, are used to signify the left foot before: of the two hinder feet, the right is called the far hind-foot, and the left hind-foot is called the near foot behind.

It is a great imperfection in a horse to have feet too large and fat, as also to have them too little: the former sort of horses are, for the most part, heavy, and apt to stumble; on the other hand, too small feet are to be suspected, because they are often painful, and subject to cloven quarters and other imperfections.

**FOOT DEROBE**, in the manege. A horse's foot gets this appellation, when it is worn and wasted by going without shoes, so that for want of hoof it is a hard matter to shoe him.

**Fat FOOT**, in the manege. A horse is said to have a fat foot, when the hoof is so thin and weak, that, unless the nails be driven very short, he runs the risque of being pricked in shoeing. The English horses are very subject to this disorder.

**FOOT-BANK**, or **FOOT-STEP**, in fortification, the same with **banquette**. See the article **BANQUETTE**.

**FOOT of the forest**, *pes forestæ*, in our ancient customs, contained 18 inches, or  $1\frac{1}{2}$  of the common foot. See **FOREST**.

**FOOT-GUARDS**. See **GUARDS**.

**FOOT-GELD**, or **FAUT-GELD**, in our old customs, an amercement laid upon those who live within the bounds of a forest, for not lawing or cutting out the ball of their dog's feet. To be free of a foot-geld, was a privilege to keep dogs un-lawed, within the bounds of a forest.

**FOOT-HOOKS**, or **FUTTOCKS**. See the article **FUTTOCKS**.

**FOOT-HUSKS**, among botanists, short heads out of which flowers grow.

**FOOT-LEVEL**, among artificers, an instrument that serves as a foot-rule, a square, and a level. See the articles **LEVEL**, **RULE**, and **SQUARE**.

**FOOT-PACE**, or **HALF-PACE**, among carpenters, a pair of stairs, whereon, after four or six steps, you arrive at a broad place, where you may take two or three paces before you ascend another step. The design of which is to ease the legs in ascending the rest of the steps. See the article **STAIR-CASE**.

**FOOT-SOLDIERS**. See **INFANTRY**.

**Fore-FOOT**, in the sea-language, the foremost part of the keel, which first takes the ground.

**FORAGE**, all kind of provision for cattle, especially for horses in time of war. See the article **FORRAGE**.

**FORAMEN**, in anatomy, a name given to several apertures, or perforations in divers parts of the body; as, 1. The external and internal foramina of the cranium or skull. 2. The foramina in the upper and lower jaw. 3. Foramen lachrymale. 4. Foramen membranæ tympani. See the articles **SKULL**, **JAW**, **LACHRYMALE**, **EAR**, &c.

**FORAMEN OVALE**, an oval aperture or passage through the heart of a foetus which closes up after birth. It arises above the coronal vein, near the right auricle, and passes directly into the left auricle of the heart, serving for the circulation of the blood in the foetus, till such time as the infant breathes and the lungs are open; it being generally reckoned one of the temporary parts of the foetus, wherein it differs from an adult, altho' almost all anatomists, Mr. Cheselden excepted, assure us, that the foramen ovale has sometimes been found open in adults. See **FOETUS** and **CIRCULATION**.

The foramen ovale therefore, and the canal of communication in the foetus are in reality no other than a sort of subsidiary parts to the lungs formed only for a certain time, and to become useless and disappear when the act of respiration

has

has given the turn to the circulation of the blood, which it is to retain through the whole life of the animal. Dr. Trew affirms, that the membrane of the foramen ovale is so placed, as to permit the blood to pass freely from the right auricle to the left, during the diastole of the auricles, but never from the left auricle to the right. See Phil. Trans. n° 457.

**FORCALQUIER**, a town of Provence, in France; thirty miles north of Aix.

**FORCE**, in mechanics, denotes the cause of the change in the state of a body when being at rest it begins to move, or has a motion which is either not uniform, or not direct.

Mechanical forces may be reduced to two sorts, one of a body at rest, the other of a body in motion.

The force of a body at rest is that which we conceive to be in a body lying still on a table, or hanging by a rope, or supported by a spring, and is called by the names of *pressure*, *vis mortua*, &c. The measure of this force being the weight with which the table is pressed; or the spring bent. See **INERTIA**.

The force of a body in motion, called *moving force*, *vis motrix*, and *vis viva*, to distinguish it from the *vis mortua*, is allowed to be a power residing in that body so long as it continues its motion, by means of which it is able to remove obstacles lying in its way, to surmount any resistance, as tension, gravity, friction, &c. and which in whole, or in part, continues to accompany it so long as the body moves. Philosophers are fully agreed about the measure of the first of these forces, *viz.* *vis mortua*, notwithstanding the diversity of appellations by which it is called; but about the measure of the last sort of force, or *vis viva*, they are divided into two parties.

The newtonians and cartesian maintain, that the moving force of bodies is in the compound ratio of their weights and velocities; and Leibnitz with his followers, pretend it to be in the compound ratio of the weights and the squares of the velocities. Those who hold the first opinion, lay down for a principle that when two bodies meet one another in contrary directions, if their moving forces be equal, neither body will prevail over each other: and if their moving forces be unequal, the stronger will always prevail over the

weaker. But the followers of Leibnitz deny the truth of this principle, and lay down others, which, as they pretend, are more clear and satisfactory; such as, that it always requires a determinate degree of force to bend a given spring to a given degree, whether this be performed in a longer or shorter time, or vice versa, and that a given spring bent to a given degree always communicates the same force to a body by unbending itself, whether the time it takes to unbend itself be longer, or shorter. But these propositions are alike denied by the Newtonians.

Now if the principle of the former be admitted as true, *viz.* that those bodies have equal forces, which meeting each other in contrary directions do not prevail over each other, it cannot be disputed that bodies which have equal quantities of motion have also equal forces; and consequently that the moving forces of bodies are in a compound ratio of their masses and velocities. On the other hand, if the principles of the Leibnicians be admitted, it is no less indisputable that the forces of moving bodies will be in a compound ratio of their masses and the squares of their velocities. Thus let  $M$  and  $m$  denote the masses of two bodies,  $V$  and  $v$  their velocities; then if any spring bent to a certain degree give the body  $M$  a certain velocity  $V$ , the same spring bent to the same degree will never give another body  $m$  a velocity  $v$ , so that  $MV$  shall be equal to  $mv$ ; but will always communicate such a velocity to  $m$ , that  $MVV$  shall be equal to  $mvv$ . And this is admitted by the Newtonians, tho' the conclusion that the forces of the bodies  $M$  and  $m$  are equal, is denied. To put an end therefore to this controversy, other principles must be found; and accordingly many subtle reasonings have been formed by several authors, concerning the nature of action, cause, effect, time, space, &c. by which we believe more readers have been confounded than enlightened; so that after all, the controversy still subsists, though carried on near seventy years, during which time a great many pieces have been published on both sides of the question, and a great many experiments have been made, or proposed to be made, in order to decide it; because tho' both parties agree in the event of the experiments, whether actually made or only proposed, yet as the writers on each side have



have found a way of deducing from those experiments a conclusion suitable to their own opinion, the disagreement still continues as wide as ever, and must remain so, while the newtonians, on the one hand, assume that *equal pressures in equal times produce equal moving forces*; and that the leibnitians, on the contrary, maintain that *equal pressures urging a body through equal spaces, produce equal forces*. Hence, supposing equal pressures to act on equal bodies, either to produce motion in them, or to stop what motion they have, the question will be whether the force generated or destroyed be proportional to the time the pressure acts, or the space thro' which it acts. For example, let two equal bodies, with velocities as 1 and 2, ascend against the action of uniform gravity according to Galileo's hypothesis, it is certain that the body whose velocity is 2 will resist the force of gravity twice the time that the body whose velocity is only 1 can do: and it is no less certain, that the body whose velocity is 2 will ascend to four times the height that the other can. So that if we measure the forces of these bodies by the pressure and time requisite to destroy their motion, these forces will be as the velocities of the moving bodies; but if we measure the forces by the pressure and space through which it extends, requisite to destroy these forces, we shall find them proportional to the squares of the velocities of the moving bodies. This holds in uniform pressures, but if the pressure be not uniform as in the action of springs, which press more or less as they are more or less bent, we must then have recourse to the fluxions of the space and time. Thus if  $p$  stand for the pressure,  $t$  for the time, and  $s$  for the space, the fluxion, or infinitesimal element of the velocity, will, according to both parties, be expressed by  $p \dot{t}$ . According to the newtonians, this is also the fluxion or element of the force; but according to the followers of Leibnitz, the element of the force is proportional to  $p \dot{s}$ . This being the case, we shall only remark that we have not met with any conclusive argument on either side, nor do we believe it possible to demonstrate the one or the other of these assertions till some body shall be metaphysician enough to analyse the notions of force, action, time, and space, farther than has hitherto been done.

Some leibnitians do not assume it as a

first principle, that action or force is proportional to the pressure and space; but they say, that a pressure being given, its action will be proportional to the velocity of the point moved by that pressure. Hence they infer, that the whole action of a pressure is as its intensity, as the velocity of the point to which it is applied, and as the time the pressure acts. And space being as the time and velocity, they conclude the action of a pressure to be as that pressure, and the space thro' which it acts. Thus 'S Gravefande, lib. 2. cap. 2. sect. 728, says, if a point runs thro' a determinate space A B, and presses with a certain given force or intensity of



pressure, it will perform the same action whether it move fast or slow, and therefore the time of the action in this case ought not to be regarded. But the Newtonians do not submit to this reasoning, and insist, that we cannot abandon the old doctrine concerning the measures of the forces of bodies in motion, without exchanging plain principles that have been generally received concerning the actions of bodies, upon the most simple and uncontested experiments, for notions that seem at best but very obscure. Let A and B (plate CI. fig. 2. n° 1.) be two equal bodies that are separated from each other by springs interposed between them (or in any equivalent manner) in a space EFGH, which in the mean time proceeds uniformly in the direction BA, in which the springs act, with a velocity as 1, and suppose that the springs imprint on the equal bodies A and B equal velocities in opposite directions that are each as 1. Then the absolute velocity of A (which was as 1) will be now as 2; and, according to the new doctrine of the Leibnitians, its force as 4. Whereas the absolute velocity and the force of B (which was as 1) will be now destroyed; so that the action of the springs adds to A a force as 3, and subducts from the equal body B, a force as 1 only; and yet it seems manifest that the actions of the springs on these equal bodies ought to be equal. In general, if  $m$  represent the velocity of the space EFGH in the direction BA,  $n$  the velocity added to that of A and subducted from that of B by the action of the springs, then the absolute velocities of A and B will be represented by  $m + n$  and  $m - n$  respectively.

tively, the force added to A by the springs will be  $2mn + nn$ , and the force taken from B will be  $2mn - nn$  which differ by  $2nn$ . Further, it is allowed that the actions of bodies upon one another are the same in a space that proceeds with an uniform motion, as if the space was at rest. But if the space EFGH was at rest, the forces communicated by the springs to A and B had been equal, and the force of each had been represented by  $nn$ . These arguments, says Mr. Maclaurin, are simple and obvious, and seem on that account to be the more proper, in treating this question. Tho' there are certain effects (continues the same author) produced by the forces of bodies that are in the duplicate ratio of their velocities, we are not thence to conclude that the forces themselves are in that ratio, no more than we are to conclude that a force which would carry a body upwards of 500 miles in a minute is infinite, because it may be demonstrated, if we abstract from the resistance of the air, that a body projected with this velocity would rise for ever, and never return to the earth. And as reaction is only equal to action when both are estimated in opposite directions upon the same right line, so we are never to estimate the force which one body loses or acquires by that which is produced or destroyed in another body in a different direction.

Mr. Euler observes, with respect to this dispute concerning the measure of vivid force, that we cannot absolutely ascribe any force to a body in motion, whether we suppose this force proportional to the velocity, or to the square of the velocity: for the force exerted by a body striking another at rest is different from that which it exerts in striking the same body in motion; so that this force cannot be ascribed to any body considered in itself, but only relatively to the other bodies it meets with. There is no force in a body absolutely considered but its inertia, which is always the same, whether the body be at rest or in motion. But if this body be forced by others to change its state, its inertia then exerts itself as a force properly so called, which is not absolutely determinable, because it depends on the changes that happen in the state of the body. Suppose, for instance, a body A forced to move in an incurvated tube or along the curve surface E a F, (*ibid.* n° 2.) the body in this case will

press the surface wherever it touches it in a direction *a a* normal to the curve; and with a certain force commonly determined in mechanics, by the mass of the body, its velocity, and by the radius of curvature O a. Now the body exerts a pressure or *vis mortua*, yet it would be absurd to ascribe a certain and determinate force of pressure to this body considered in itself, since this pressure may vary very much according to the difference of the curvature of E a F. In like manner, it seems unreasonable to place a certain absolute force of percussion in bodies, since it principally depends on the external circumstances accompanying the shock. A second observation which has been made by several great men is, that the effect of a shock of two or more bodies is not produced in an instant, but requires a certain interval of time. If this be so, the heterogeneity between the *vires viue* and *mortue* vanishes; since a pressure may always be assigned, which in the same time, however little, shall produce the same effect. If then the *vires viue* be homogeneous to the *vires mortue*, and since we have a perfect measure and knowledge of the latter, we need require no other measure of the former than that which is derived from the *vires mortue* equivalent to them.

Mr. Euler has also given some calculations with respect to the force of percussion resulting from the pressures which elastic and non-elastic bodies exert on each other while the collision lasts, determining these pressures for every instant of the shocks; and where the bodies are very hard, he finds the force of percussion to be in a compound ratio of the velocity, and of the subduplicate ratio of the mass of the striking body; so that in this case neither the Leibnitian, nor the Cartesian proportions take place. But as we cannot pretend to give a full account of this controversy, we must refer the curious to Mr. Euler's dissertations in the Memoirs of the Academy of Berlin, and to some of the principal authors on each side of the question, such as Sir Isaac Newton, Mr. Maclaurin, Dr. Jurin, Dr. Pemberton, Mr. Robins, Monf. de Mailan, &c. in favour of the old opinion; Mess. Leibnitz, Bernoulli, Herman, Poleni, Wolfius, 'S Gravefande, &c. in support of the new; and shall only observe in this place, that the experiments of Desaguliers, Poleni, &c.

tho' they do not decide the controversy, are nevertheless of great use, and that whatever may be said of the metaphysical part, it is certain, that no useful conclusion in mechanics is affected by the disputes concerning the mensuration of the force of bodies in motion, as has been objected to mathematicians by the analyst in Query IX.

*Central FORCE.* See CENTRAL.

*Centrifugal FORCE.* See CENTRIFUGAL.

*Centripetal FORCE.* See CENTRIPETAL.

*FORCE of inactivity.* See INERTIA.

*FORCE of wind.* See WIND.

**FORCE**, in law, signifies any unlawful violence offered to things or persons, and is divided into simple and compound. *Simple force* is what is so committed, that it has no other crime attending it, as when a person by force enters on another's possession without committing any other unlawful act. *Compound force*, is where some other violence is committed with such an act which of itself alone is criminal; as if one enters by force into another's house, and there kills a person, or ravishes a woman. There is likewise a force implied in law, as in every trespass, forcous or disseisin, and an actual force with weapons, number of persons, &c. Any person may lawfully enter a tavern, inn, or victualling-house; so may a landlord his tenant's house to view repairs, &c. But if, in these cases, the person that enters commits any violence or force, the law will intend that he entered for that purpose.

*Fresh FORCE.* See the article FRESH.

**FORCEPS**, in surgery, &c. a pair of scissars for cutting off, or dividing, the fleshy membranous parts of the body, as occasion requires. See SCISSARS.

A surgeon should be well provided with these; some straight, and of different sizes, like common scissars; others crooked, proper to be used in fistulæ, and in many other cases, (see plate CL fig. 3. n° 1.) and others, again, furnished with teeth at one end, used to remove dressings, to extract musket-balls, splinters, thorns, &c. and on many other occasions, (*ibid.* n° 2.)

Forcepses are commonly made of steel, but those of silver are much neater.

**FORCER**, or **FORCING-PUMP**, in mechanics, is a kind of pump in which there is a forcer or piston without a valve.

The forcing-pump consists of a barrel ABC (plate CL fig. 4. n° 1.) in

which there is a forcer I, which moves up and down in it. The barrel communicates with two pipes, the one called a sucking-pipe BC, which goes down into the well, and the other called a forcing-pipe FG, which goes upwards. There are two valves, the one D, at any place of the pipe BC, and the other E, in the pipe FG; both which let the water go up, and hinder it from coming down.

Then when the forcer is moved upwards, as it rarefies the air in the pipe BC, (for the valve E hinders the outward air which presses upon it from going thro') the water rises in it, till after several strokes it comes to the forcer: then at every time the forcer goes down, the water that is pressed downwards being hindered from going thro' the valve D, opens the valve E, and goes up the pipe FG. When the forcer goes up again, then the water in the pipe FG shuts by its pressure the valve E, and consequently the water in the well rises up the pipe BE, and the same happens at every motion of the forcer. It is to be observed in the forcing pump, that the nearer the forcer comes to the well, the better it is, for the same reason as in the sucking pump. See the article PUMP.

There are several ways of making forcers: the most common of all consists of a brass-cylinder, a very little less in diameter than the bore of the barrel, (*ibid.* n° 2.) at the top B and at the bottom D, and turned less still at the middle CC in order to let in a leathern collar EE (*ibid.* n° 3.) which makes it just equal to the bore of the barrel, so as to fit it quite when it is put into it. The second sort of forcers consists of three brass-cylinders A, B, C, (*ibid.* n° 4, 5, 6) which can be screwed together. The middle one B ought to be almost equal in diameter to the bore of the pipe, so as to slide in it without any friction. The upper A and the lower C must be a little less and equal to one another. There are two leathers, D and E, (*ibid.* n° 7, 8.) which must be put between them when they are unscrewed. Then it is evident, that if the cylinders be screwed together, and the leathers apply themselves folding upwards round the upper part A, and downwards round the lower C, they will become just equal to the bore of the barrel, and consequently they will hinder any air from getting thro' the sides of the forcer when it moves up and down in the barrel. The use of

the middle brass cylinder B is to hinder the leathers from turning themselves back by the motion.

But the best way of making forcers is to have a plunger, or solid brass-cylinder A (*ibid.* n° 9.) equal in length to the barrel, and a little less in diameter than the bore, so that it can move freely in it without any friction: there must be two hollow short brass rings C C, D D (*ibid.* n° 10, 11.) at the top of the barrel F, (*ibid.* n° 12.) which can be screwed together. The upper one C C must be equal in bore to it, and the lower D a little less. There are two leathers as in (n° 7, 8.) both having in the middle a less hole than the bore of the pipe.

The one must be applied between the barrel and the ring D, and the other between the same D and the upper one C, and the whole must be screwed together. Then if the solid cylinder A (n° 9.) be put into it and moved up and down, it is evident that the fore-mentioned leathers which are applied the one to the barrel, the other to the inside of the hollow cylinder C will hinder any air from getting between them and the solid cylinder A. The advantage of this kind of forcers is, that they have no other friction but at the top of the barrel, and that the inside of the barrel need not be smooth as in other kinds of pumps, but only the outside of the forcer A must be turned true and polished, which can be done a great deal easier. The lower part of the forcer A must be turned a little conical, that it may be brought into the barrel, without any resistance of the upper leather of the above-mention'd collar or jack-head. See the article PISTON.

**FORCHAIN**, a town of Franconia, in Germany, sixteen miles south of Bamberg.

**FORCIBLE**, in law, something done illegally. See the article FORCE.

A **FORCIBLE entry**, is a violent and actual entry into houses, or lands; and a forcible detainer, is where one by violence with-holds the possession of lands, &c. so that the person who has a right of entry is barred, or hindered, therefrom.

At common law, any person that had a right to enter into lands, &c. might retain possession of it by force. But this liberty being abused, to the breach of the peace, it was therefore found necessary that the same should be restrained. That at this day, he who is wrongfully

dispossessed of goods may by force retake them. By statute, no persons shall make an entry on any lands or tenements, except where it is given by law, and in a peaceable manner, even though they have title of entry, on pain of imprisonment; and where a forcible entry is committed, justices of peace are authorized to view the place, and enquire of the force by a jury, summoned by the sheriff of the county: and they may cause the tenements, &c. to be restored, and imprison the offenders till they pay a fine. Likewise a writ of forcible entry lies, where a person seized of freehold, is by force put out thereof. See ENTRY.

**FORCIBLE MARRIAGE**, of women having estates in lands, &c. is felony by law, and the takers, procurers, abettors, and receivers of the woman so taken away against her will, and knowing the same, are likewise deemed principal felons; but as to the procurers and abettors, they must be such before the fact committed, to be excluded benefit of clergy.

**FORCING**, among gardeners, signifies the making trees produce ripe fruit before their usual time. This is done by planting them in a hot bed against a south-wall, and likewise defending them from the injuries of the weather by glass frame. They should always be grown trees, as young ones are apt to be destroyed by this management. See HOT-BED. The glasses must be taken off at proper seasons, to admit the benefit of fresh air, and especially of gentle showers.

**FORCING OF WINE**. See WINE.

**FORCING-PUMP**. See FORCER, supra.

**FORE-CASTLE OF A SHIP**, that part where the foremast stands. 'Tis divided from the rest by a bulk-head. See the article SHIP.

**FORE-CLOSED**, in law, signifies the being shut out, and excluded, or barred, the equity of redemption on mortgages, &c.

**FORE-FOOT**, in the sea-language, signifies one ship's lying, or sailing, cross another's way: as if two ships being under sail, and in ken one of another, one of them lying in her course with her stem so much a weather the other, that holding on their several ways, neither of them altering their courses, the windward ship will run a-head of the other: then it is said, such a ship lies with the other's forefoot.

**FOREIGN**, some thing extraneous, or that comes from abroad.

Foreign, in our law, is used in various significations. Thus,

**FOREIGN ATTACHMENT**, is an attachment of the goods of foreigners, found within a city, or liberty, for the satisfaction of some citizen, to whom the foreigner is indebted; or it signifies an attachment of a foreigner's money in the hands of another person. See **ATTACHMENT**.

**FOREIGN KINGDOM**, a kingdom under the dominion of a foreign prince.

At the instance of an ambassador, or consul, an offender against the laws here may be sent for hither from a foreign kingdom. And where a stranger of Holland, or any foreign country, buys goods at London, for instance, and there gives a note under his hand for payment, after which he goes away privately into Holland; in that case, the seller may have a certificate from the lord mayor, on the proof of the sale and delivery of such goods, whereupon a process will be executed on the party in Holland.

**FOREIGN MATTER**, any thing which is done, and, therefore, triable in another country.

**FOREIGN OPPOSER, or APPOSER**, an officer in the exchequer, that apposes, or makes a charge on all sheriffs, &c. of their green wax: that is to say, fines, issues, amerciaments, recognizances, &c.

**FOREIGN PLEA**, signifies an objection to the judge of the court, by refusing him as incompetent, because the matter in question is not within his jurisdiction. All foreign pleas that are triable by the country on any indictment for murder, or felony, shall be tried, without delay, before the justices, where the party is arraigned, and by the jurors of the same county, though the matters of such pleas are alleged to be in any other county or counties: but this does not extend to treason, nor to appeals; a foreign issue wherein must be tried, as formerly, by a jury of that county where the fact is laid. If a foreign plea is pleaded in a civil action, the court generally makes the defendant put it in upon oath that the same is true, or will cause judgment to be entered for want of a plea.

**FOREIGN SERVICE**, that service by which a mean lord holds of another without the compass of his own fee; or it is that which the tenant performs either to his own lord, or the lord paramount, out of the fee.

**FOREIGN SEAMEN**, serving two years on

board british ships, whether of war, trade, or privateers, during the time of war, shall be deemed natural-born subjects.

**FOREIGNER**, the natural-born subject of some foreign prince.

Foreigners, tho' made denizens, or naturalized, are disabled to bear any office in the government, to be of the privy-council, or members of parliament, &c. This is by the acts of the settlement of of the crown. Such persons as are not freemen of a city, or corporation, are also called foreigners, to distinguish them from the members of the same.

**FOREJUDGER**, in law, signifies a judgment, whereby one is deprived or put by a thing in question.

To be forejudged the court, is where an officer, or attorney, of any court, is expelled the same, for male-practice; or for not appearing to an action on a bill filed against him, &c. And where an attorney of the common-pleas is sued, the plaintiff's attorney delivers the bill to one of the criers of the court, who calls the attorney defendant, and solemnly proclaims aloud, that if he does not appear thereto, he will be forejudged; likewise a rule is given by the secondary for his appearance, and if the attorney appears not in four days, then the clerk of the warrants strikes such an attorney off the roll of attorneys; after which he becomes liable to be arrested like any other person: but where an attorney is forejudged, he may be restored on clearing himself from his contumacy, and making satisfaction to the plaintiff, &c.

**FORE-KNIGHTS**. See **KNIGHTS**.

**FORELAND**, in the sea-language, the same with a capc. See the article **CAPE**.

**FORELAND**, in fortification, the same with liziere. See the article **LIZIERE**.

**FORELOCKS**, in the sea-language, little flat wedges made with iron, used at the ends of bolts, to keep them from flying out of their holes.

**FORELOIN**, among huntmen, is when a hound, going before the rest of the cry, meets chase, and goes away with it.

**FORELORN-HOPE**, in the military art, signifies men detached from several regiments, or otherwise appointed, to make the first attack in day of battle, or, at a siege, to storm the counterscarpe, mount the breach, or the like.

They are so called from the great danger they are unavoidably exposed to; but the word is old, and begins to be obsolete.

**FOREMAST** OF A SHIP, a large, round piece of timber, placed in her fore-part, or fore-castle, and carrying the fore-sail and fore-top-sail yards. Its length is usually  $\frac{3}{4}$  of the main mast. And the fore-top gallant-mast is  $\frac{1}{2}$  the length of the fore-top-mast. See **MAST**.

**FOREMAST-MEN**, are those on board a ship that take in the top-sails, sling the yards, furl the sails, bowse, trice, and take their turn at the helm, &c.

**FORE-RAKE**, in the sea language. See the article **RAKE**.

**FORE-REACH**, in the sea-language, a ship is said to fore-reach upon another, when both sailing together, one sails better, or out-goeth the other.

**FORESCHOKE**, in our old authors, signifies the same with forsaken, and is particularly used in one of our statutes for lands or tenements seised by the lord for want of services performed by his tenant, and quietly held by such lord above a year and a day, without any due course of law taken by the tenant for recovery thereof; here he does in presumption of law disavow or forsake all the rights he has thereto, for which reason those lands shall be called foreschoke.

**FORE-SKIN**, in anatomy, the same with prepuce. See the article **PREPUCE**.

**FOREST**, *sylva*, in general, a great wood, or a large extent of ground covered with trees.

**FOREST**, in law, is defined, by Manwood, a certain territory of woody grounds, and fruitful pastures, privileged for wild beasts and fowls of forest, chase and warren, to rest and abide under the protection of the king, for his princely delight, bounded with unremoveable marks, and meres, either known by matter of record or prescription; replenished with wild beasts of venery, or chase, with great coverts of vert for the said beasts; for preservation and continuance whereof, with the vert and venison, there are certain particular laws, privileges, and officers.

Forests are of that antiquity in England, that, excepting the new forest in Hampshire, erected by William the Conqueror, and Hampton-Court, erected by Henry VIII. it is said, that there is no record or history which makes any certain mention of their erection, tho' they are mentioned by several writers, and in divers of our laws and statutes.

There are sixty-nine forests in England, thirteen chaces, and 300 parks. The four principal forests are New-Forest, Sherwood-Forest, Dean-Forest, and Windsor-Forest.

The manner of erecting a forest is thus, *viz.* Certain commissioners are appointed under the great seal, who view the ground intended for a forest, and fence it round: this commission being returned into chancery, the king causeth it to be proclaimed throughout the county where the land lieth, that it is a forest, and prohibits all persons from hunting there, without his leave. Tho' the king may erect a forest on his own ground and waste, he may not do it on the ground of other persons without their consent; and agreements with them for that purpose, ought to be confirmed by parliament.

A forest, strictly taken, cannot be in the hands of any but the king, for no person but the king has power to grant a commission to be justice in eyre of the forest; yet, if he grants a forest to a subject, and that on request made in the Chancery, that subject and his heirs shall have justices of the forest, in which case the subject has a forest in law.

A second property of a forest is the courts thereof, as the justice seat, the swainmote, and the court of attachment. See the article **ATTACHMENT**, &c.

A third property is the officers belonging to it, as the justices, warden, verderer, forester, agistor, regarder, keeper, bailiff, beadle, &c. See the articles **AGISTOR**, **BAILIFF**, **FORESTER**, &c.

By the laws of the forest, the receivers of trespassers in hunting, or killing of the deer, if they know them to be the king's property, are principal trespassers. Likewise, if a trespass be committed in a forest, and the trespasser dies, after his death, it may be punished in the lifetime of the heir, contrary to common law. Our Norman kings punished such as killed deer in any of their forests with great severity; also in various manners; as by hanging, loss of limbs, gelding, and putting out eyes. By *magna charta de foresta*, it is ordained, that no person shall lose life or member for killing the king's deer in forests, but shall be fined; and if the offender has nothing to pay the fine, he shall be imprisoned a year and a day, and then be delivered, if he can give security, not to offend for the future, &c. 9 Hen. III. c. 1.

Before

Before this statute, it was felony to hunt the king's deer; and by a late act, persons armed and disguised, appearing in any forest, &c. if they hunt, kill, or steal any deer, &c. are guilty of felony. 9 Geo. I. c. 22.

He who has any licence to hunt in a forest or chase, &c. is to take care that he do not exceed his authority: otherwise he shall be deemed a trespasser from the beginning, and be punished for that fact, as if he had no licence. See the article FORESTER.

**FOREST-TREES.** Many are averse to pruning of forest-trees; but tho' it is to be done with care, yet it is by no means to be wholly omitted. It is observable in most forests, that, where one tree thrives well, there are twenty that grow faulty, all owing to their want of pruning, or lopping in a proper manner: for this, when wisely executed, is not only a renewal of their age, but of their growth too; the want of it being the occasion of trees running out with suckers, and over-loading themselves with wasteful boughs, which draw all the sap from the upper part of the tree, and make it knotty, mossy, and unthrifty.

If a tree grows crooked, at the crooked place cut it off, sloping upwards, and nurse up one of the principal shoots to be a leading shoot, except it is of such a sort as is subject to die when headed: crooked trees may be made straight by shredding up the side-branches, till you come above the crook where they are young. If any boughs are crot by goats, or other cattle, cut them off close to the body, for cattle leave a drivel where they bite, which not only infects the branches, but sometimes endangers the whole tree. See the articles LOPPING, PRUNING, and TREE.

*Assise of a FOREST.* See ASSISE.

*Charter of a FOREST.* See the article CHARTER.

*Drift of the FOREST.* See DRIFT.

*Foot of the FOREST.* See the article FOOT.

*Keeper of the FOREST.* See KEEPER.

*Perambulation of the FOREST.* See the article PERAMBULATION.

*Reposition of the FOREST.* See the article REPOSITION.

*Waste of the FOREST.* See WASTE.

**FOREST-TOWNS**, in geography, certain towns of Swabia, in Germany, lying along the Rhine, and the confines of Switzerland, and subject to the house of

Austria. Their names are Rhinefeld, Seckingen, Laufenburg, and Waldshut.

**FORE-STAFF**, or **CROSS-STAFF**, an instrument used at sea for taking the altitude of the sun, moon, or stars. It is called *fore-staff*, because the observer, in using it, turns his face towards the object: whereas, in using Davis's quadrant, the back of the observer is towards the object; and hence its denomination of *back-staff*. See the article BACK-STAFF.

The *fore-staff* is a square graduated staff AB, (plate CII. fig. 1. n<sup>o</sup>. 1.) about three feet long, and half an inch thick. Each side is graduated like a line of tangents, and has a peculiar cross piece or vane, which slides thereon. The first cross piece, FF, belongs to that side where the divisions begin at 3°, and end with 10°; and hence called the *ten-cross*. The second, EE, is called the *thirty-cross*, as belonging to that side where the degrees begin at 10° and end at 30°. The third, DD, is called the *sixty-cross*, as belonging to that side of the instrument where the divisions begin at 20° and end at 60°. The fourth cross-piece, CC, is called the *ninety-cross*, as belonging to that side where the divisions begin at 30° and end at 90°.

For the manner of graduating the staff AB like a line of tangents. See the article TANGENT.

To observe the sun's altitude by this instrument. First consider, as near as you can guess, whether the altitude be under 10°; in which case, the shortest or *ten-cross* is to be used. If the altitude be guessed to be above 10°, but under 30°, the *thirty-cross* is to be used; if under 60°, the *sixty-cross*; and if above 60°, the *ninety-cross*. Having fitted on the proper cross, place the flat end of the staff A (*ibid.* n<sup>o</sup>. 2.) to the outside of the eye, and look for the object at the upper end of the cross D; and for the horizon, at the lower end C; moving the cross backward and forward on the staff, till you see the center of the sun, or other object, by the upper end D, and the horizon by the lower end C. Then the degrees and minutes cut by the inner edge of the cross, on the proper side of the staff for that cross, make the altitude of the sun or star at the time of observation. In order to enable the eye to bear the splendor of the sun, a coloured glass is used at the top of the cross. If the meridian altitude be required, continue your observation

servation as long as the altitude of the object increases, still moving the cross nearer to the eye.

By fitting a horizontal vane on the eye-end of the staff A, (*ibid.* n<sup>o</sup> 2.) and a sight-vane on the lower end of the proper cross at C, the sun's altitude may be found with the observer's back turned towards the luminary: for looking through the sight-vane at C, let the cross-piece be moved up or down, till the shadow made by its upper end fall on the slit in the horizontal vane; the horizon being seen at the same time through the vanes at C and A; then will the degrees cut on the proper side of the staff, be the sun's altitude required.

**FORESTAGE**, in our old law-writers, a duty said to have been formerly paid by foresters to the king. See **FORESTER**.

**FORESTALLER**, a person who is guilty of forestalling. See the next article.

**FORESTALLING**, in law, buying or bargaining for any corn, cattle, victuals, or merchandize in the way as they come to fairs or markets to be sold, before they get thither, with an intent to sell the same again at a higher price.

The punishment for this offence, upon conviction at the quarter sessions, by two or more witnesses, is, for the first time, two months imprisonment and the loss of the goods, or the value; for the second offence, the offender shall be imprisoned six months, and lose double the value of the goods; for the third offence, he shall suffer imprisonment during the king's pleasure, forfeit all his goods and chattles, and stand on the pillory: but the statute does not extend to maltsters buying barley, or to badgers licensed.

**FORESTER**, a sworn officer of the forest, appointed by the king's letters patent, to walk the forest at all hours, watch over the vert and venison; also to make attachments and true preiements of all trespasses committed within the forest. See the article **FOREST**.

If a man comes into a forest in the night, a forester cannot lawfully beat him before he makes some resistance; but in case such a person resists the forester, he may justify a battery. And a forester shall not be questioned for killing a trespasser that, after the peace, cried to him, will not surrender himself, if it be not done on any former malice; though, where trespassers in a forest, &c. do kill a person that opposes them, it is murder

in all, because they were engaged in an unlawful act, and therefore malice is implied to the person killed.

**FORE-TOP-MAST**, and **FORE-TOP-GALLANT-MAST**. See **FORE-MAST**.

**FORFAR**, the capital of the county of Angus, in Scotland: west long. 2° 32', and north lat 56° 25'.

It is a parliament-town, classed with Perth, Dundee, Cowper, and St. Andrews, which all together send one member.

**FORFEITURE**, properly signifies the effect of transgressing some penal law, and extends to lands or goods.

Forfeiture differs from confiscation, in that the former is more general, whilst confiscation is particularly applied to such things as become forfeited to the king's exchequer; and goods confiscated, are said to be such as no body claims.

*Full* **FORFEITURE**, *plena forisfactura*, called also *plena civita*, is the forfeiture of life and member, and all that a person has: this obtains in criminal cases, as where a person is attainted of treason, felony, &c. There is also a forfeiture in civil cases, as where a person hath an estate for life or years, he may forfeit it by alienation and claiming, or granting a larger estate than is veiled in him. All the lands or tenements of an offender, whether held in fee or tail, are forfeited on his committing high treason; and the king shall be deemed in possession thereof without any office found, saving the rights of others. For petit treason, murder, robbery, burglary, and all felonies punished with death, the offenders forfeit their lands in fee, goods and chattels. In manslaughter, goods and chattels are forfeited; so in chance-medly, and se defendendo, though here an offender has his pardon of course. In the case of petit larceny, goods are also forfeited. See the article **TREASON**, &c.

**FORFEITURE of marriage**, a writ which formerly lay against a person that held lands by knights service, who, being under age and unmarried, refused her whom the lord offered him, without disparagement, and married another.

**FORFEX**, among surgeons, the same with forceps. See the article **FORCEPS**.

Some also call an instrument for drawing teeth by the name of *forfex*.

**FORFICULA**, the **EAR-WIG**, in zoology, a troublesome insect, which takes its english name from its introducing itself into peoples ears, where it causes a great deal



of pain; and its latin name, *forficula*, from its forked tail, which is a sort of forceps, capable of pinching. The exterior wings are very short or dimidiated, and wholly cover the inner ones. The antennæ are long and slender, consisting of thirteen or fourteen articulations.

According to Lemery, the dried powder of these insects, is good in cases of deafness; and the oil drawn from them, in convulsive cases.

**FORFICULA MARINA**, the SEA-EAR-WIG, an insect found about the sea-shores, and so called from its resemblance to the common ear-wig.

**FOREFIELD**, among miners, the farthest place of a meer of ground. See **MEER**.

**FORGE**, properly signifies a little furnace, wherein smiths and other artificers of iron or steel, &c. heat their metals red hot, in order to soften and render them more malleable and manageable on the anvil. See **FURNACE**.

The forge used by the several operators in iron, is very simple: we shall instance in that of the black-smiths, to which all the rest are reducible, the construction of which is as follows. The hearth or fire-place of the forge, marked A, (See plate of smithery, fig. 1.) is to be built up from your floor with brick, about two feet and an half, or sometimes more, according to the purpose you design to forge for: if your forge be intended for heavy work, your hearth must lie lower than it need be for light work: the forge may be of what breadth is thought convenient. It may be built with hollow arches underneath, to set several things out of the way: the back of it is built upright to the top of the ceiling, and inclosed over the fire-place with a hovel, which ends in a chimney, to carry away the smoke, as at B. In the back of the forge, against the fire-place, is fixed a thick iron-plate, and a taper pipe in it, about five inches long, which pipe comes through the back of the forge at C. Into this taper pipe is placed the nose or pipe of the bellows: the office of this tewel is to preserve the pipe of the bellows and the back of the forge about the fire-place, from burning. Right before the back is placed, at about two feet distance, the trough, which reaches commonly the whole breadth of the forge, and is as broad as is thought necessary, as at D. The bellows is placed behind the back of the forge, having one of its

boards so fixed, that it can neither move upwards nor downwards. At the ear of the upper board is fastened a rope or chain at E, which reaches up to the rocker, and is fastened there to the further end of the handle, at F. This handle is fastened across a rock-staff, which moves between two cheeks upon the center pins, in two sockets, at G; so that by drawing down this handle, the moving board of the bellows rises; and by a considerable weight set on the top of its upper board, sinks down again, and by this agitation performs the office of a pair of bellows. See **BELLOWS** and **SMITHERY**.

**FORGE** is also used for a large furnace, wherein iron-ore, taken out of the mine, is melted down; or it is more properly applied to another kind of furnace, wherein the iron-ore, melted down and separated in a former furnace, and then cast into sows and pigs, is heated and fused over again, and beaten afterwards with large hammers, and thus rendered more soft, pure, ductile, and fit for use.

Of these there are two kinds: the first is called the finery, where the pigs are worked into gross iron, and prepared for the second, which is called the chafery, where it is further wrought into bars fit for use. See the articles **FORGING**, **FINERY**, and **CHAFERY**.

**FORGER**, in law, one guilty of forgery. See the next article.

**FORGERY**, in a legal sense, is where a person fraudulently makes and publishes false writings to another's prejudice: or, it signifies the writ that lies against him who offends that way.

Forgery is either at common law, or by statute; and is an offence punishable by indictment, information, &c. and not only where a person makes a false deed, but where any fraudulent alteration is made of a true one, in a material point thereof. Likewise a writing may be said to be forged, where one being directed to draw up a will for another, does insert some legacies therein falsely of his own head; though, in such cases, there is no forgery of the hand or seal of the party: but a person cannot regularly be guilty of this crime by an act of omission, unless it alters the limitation of an estate to another, in which case it may be forgery. By a statute of George II. c. 25. the forging or counterfeiting any deed, will, bond, bill, note, &c. with intent to defraud any person, or publishing such false deed,

deed, bond, &c. knowingly, is declared to be felony; and the offender shall suffer death. The king may pardon the corporal punishment of forgery which tends to public example, tho' the plaintiff cannot release it: yet in an extraordinary case, a forgery has been compounded, and the defendant discharged on paying a small fine.

**FORGING**, in smithery, the beating or hammering iron on the anvil, after having first made it red hot in the forge, in order to extend it into various forms, and fashion it into works. See **FORGE**.

There are two ways of forging and hammering iron; one is by the force of the hand, in which there are usually several persons employed, one of them turning the iron and hammering likewise, and the rest only hammering. The other way is by the force of a water-mill, which raises and works several huge hammers beyond the force of man; under the strokes whereof the workmen present large lumps or pieces of iron, which are sustained at one end by the anvils, and at the other by iron-chains fastened to the ceiling of the forge. See **MILL**.

This last way of forging is only used in the largest works, as anchors for ships, &c. which usually weigh several thousand pounds. For the lighter works, a single man serves to hold, heat, and turn with one hand, while he hammers with the other.

Each purpose the work is designed for, requires its proper heat; for if it be too cold, it will not feel the weight of the hammer, as the smiths call it, when it will not batter under the hammer; and if it be too hot, it will red-sear, that is, break or crack under the hammer.

The several degrees of heats the smiths give their irons, are, first, a blood-red heat; secondly, a white flame-heat; and, thirdly, a sparkling or welding heat. See the article **HEAT**.

**FORGING MILLS**. See the article **MILL**.

**FORISFAMILIARI**, in law, is where a son accepts of his father's part of lands, &c. in the lifetime of the father, and rests contented with it, so that he cannot claim any more; upon which account he is termed *forisfamiliatus*.

**FORKED HEAD**, among sportsmen, those deer's heads, which have their crookes doubled.

**FORK-TAIL**, is given in some parts of the kingdom to the salmon, in the fourth year of its growth.

**FORLANA**, in music, a kind of dance, nearly allied to the saltarella. See the article **SALTARELLA**.

**FORLI**, a town of Romania, in the pope's territories, fifteen miles south-west of Ravenna.

**FORLORN**, or **FORELORN**. See the article **FORELORN**.

**FORM**, *forma*, in physics, the essential or distinguishing modification of the matter whereof a natural body is composed, so as thereby to give it such a particular manner of existence; being that which constitutes it such a particular body, and distinguishes it from every other body. The origin of forms, though esteemed the noblest, hath yet been found one of the most perplexed inquiries in philosophy, especially as managed by the schools. The sum of the controversy is whether the form of natural things be, in generation, educed out of the power of the matter; or whether these forms are true substantial entities, distinct from the other substantial principle of natural bodies, that is matter.

The reasons which move me to embrace the negative, says Mr. Boyle, are principally these. First, I see no necessity for admitting any such substantial forms in natural things; matter and its accidents being sufficient to explain as much of the phenomena of nature as we are likely to understand. In the next place, I see no use of this puzzling doctrine of substantial forms in natural philosophy: nor can I imagine how a particular phenomenon should be explained by a principle whose nature is unknown: and, lastly, I cannot conceive how forms could be generated, as the peripatetics would have it.

On the other hand, the schoolmen tell us, that the power of matter, with regard to forms, is partly eductive, as the agent can make the form out of it; and partly receptive, whereby it can receive the form so made: but since the schoolmen will not allow that the form of a generated body was actually pre-existent in its matter, or any where else, it is hard to conceive how a substance can be educed out of another substance totally distinct in nature from it, without being before such education actually existent in it. And as for the receptive power of the matter, that fits it to receive or lodge a form, when united with it, how can it intelligibly be made to appear to contribute to the production of a new substance of a quite

quite different nature from that matter, though it harbours it, when produced.

In short, the form of a natural body, as is illustrated and confirmed by Sir Isaac Newton's doctrine of motion, (see Newton's Optic. p. 372, 37 .) is but an essential modification, and, as it were, the stamp of its matter; or such a convention of the magnitude, shape, motion or rest, situation and contexture of the small parts that compose it, as is necessary to constitute and denominate it a particular body; and all those accidents being producible in matter by local motion, we may well say that the first and universal, though not immediate cause of forms, is no other than God, who put matter into motion, established its laws among bodies, and also guided it, in several cases, at the beginning of things; and that among second causes, the grand efficient of forms is local motion, which by variously dividing, sequestering, transposing, and connecting the parts of matter, produces in them those accidents and qualities upon account whereof the portion of matter they diversify belongs to a determinate species of natural bodies: yet this is not so to be understood as if motion were only an efficient cause in the generation of bodies, for it is also frequently one of the chief accidents, as in water, fire, &c. that concur to make up the form. See the articles MOTION and FIRE.

Some modern writers, as particularly Sennertus, teach us, that besides the specific form in plants and animals, there reside, and especially in some determinate parts of them, certain other forms proper to those parts, but so subjected to the predominant form, as to deserve the title of subordinate; being, during the reign of the specific form, subservient to it: though, when the specific form comes to be abolished, these subordinate forms may set up for themselves, and in reference to those parts of matter they belong to, exercise the functions of specific forms; as in a dog or a horse, besides the sensitive soul, which is the specific form of the whole creature, the flesh, blood, and bones have their distinct forms appertaining to them, though they are ruled and employed by the soul, but as the matter which she animates and informs; and when by death the sensitive soul or specific form is deposed or abolished, the body is not presently resolved into its several elements, but those sub-

ordinate forms still preserve the flesh, as in the state of the flesh; and the bones, as in the state of the bones; the one for a little, and the other for a much longer time. This doctrine is urged from the specific virtues observable in gathered plants, as the purgative faculty of rhubarb, senna, and other cathartic vegetables. But, says Mr. Boyle, it were not difficult to propose experiments, which would determine this matter otherwise, were it important enough to deserve it. However, as this doctrine of subordinate forms affords such countenance to that of substantial ones, that author has been at the pains to prove, that subordinate forms are explicable upon other principles. See Shaw's Boyle, vol. I. p. 224.

**FORM of Syllogisms**, or **Syllogistic FORM**, among logicians, a just disposition both of the terms, in respect of predicate and subject, and of the propositions, in respect of quantity and quality: by which is only meant a disposition wherein the conclusion follows duly and legitimately from the two premises; there being no form, where there is no conclusion. See the article SYLLOGISM.

**FORM**, in theology, is said to be one of the essential parts of the sacraments; being that which gives them their sacramental nature and efficacy, and consisting in certain words, which the priest pronounces in administering them.

**FORM** is also used, in a moral sense, for the manner of being or doing a thing according to rules: thus we say, a form of government, a form of argument, &c.

**FORM**, in law, the rules established and requisite to be observed in legal proceedings.

**FORM**, in carpentry, is used to denote the long seats or benches in the choirs of churches or in schools, for the priests, prebends, religious, or scholars to sit on. At schools, the word form is frequently applied to what is otherwise termed a class. See the article CLASS.

**FORM** also denotes the external appearance or surface of a body, or the disposition of its parts, as to the length, breadth, and thickness. See the article FIGURE.

**FORM** is also used, among mechanics, for a sort of mould, whereon any thing is fashioned or wrought: as the hatters form, the paper-makers form, &c. See the article HATTER, &c.

**Printer's FORM**, an assemblage of letters, words and lines, ranged in order, and

so disposed into pages by the compositor; from which, by means of ink and a press, the printed sheets are drawn.

Every form is inclosed in an iron-chase, wherein it is firmly locked by a number of pieces of wood; some long and narrow, and others of the form of wedges. There are two forms required for every sheet, one for each side; and each form consists of more or fewer pages, according to the size of the book.

**FORM**, in hunting, the seat of a hare; or the place and time, when and where she squats.

**FORM** of a *series*, in algebra, that affection of an undeterminate series, which arises from the different values of the indices of the unknown quantity. See **SERIES**.

**FORMA PAUPERIS**, in law, is when a person has just cause of suit, but is so poor, that he cannot defray the usual charges of suing at law or in equity; in which case, on making oath that he is not worth 5*l.* in the world, on all his debts being paid, and producing a certificate from some lawyer that he has good cause of suit, the judge will admit him to sue in *forma pauperis*; that is, without paying any fee to counsellors, attorneys, or clerk: the statute 11 Hen. VII. c. 12, having enacted, that council and attorneys, &c. shall be assigned such poor persons gratis. Where it appears that any pauper has sold or contrasted for the benefit of his suit, whilst it is depending in court, such cause shall be thenceforth totally dismissed; and a person suing in *forma pauperis*, shall not have a new trial granted him, but is to acquiesce in the judgment of the court.

**FORMAL**, something belonging to, or constituting the form of a thing. See the article **FORM**.

**FORMAL CAUSE**. See the article **CAUSE**.

**FORMALLY**, *formaliter*, a term of various import in the schools. 1. Sometimes it denotes a subject, in which the predicate is contained merely on account of its form: thus white implies whiteness. 2. In a synonymous sense with adequately. 3. For really, &c. See the article **FORM**.

**FORMALITY**, in the schools, that quality which constitutes the form of a thing. See the article **FORM**.

**FORMALITY**, in matters of law and polity, certain rules of judiciary proceedings, negotiations, and contracts, which custom or law hath made necessary, and

therefore ought to be strictly observed. See the article **CEREMONY**.

**FORMATION**, in philosophy, an act whereby something is formed or produced. For the formation of the foetus in the womb, see the articles **FOETUS** and **GENERATION**.

**FORMATION** of *stones and pebbles*. See the articles **STONE** and **PEBBLE**.

**FORMATION** of *metals and minerals*. See the articles **METAL** and **MINERAL**.

**FORMATION**, in grammar, signifies the manner of forming one word from another: thus accountantship is formed from accountant, and this last from account.

**FORMATUM PUNCTUM**. See the article **PUNCTUM**.

**FORME'**, or **CROSS FORMY**, in heraldry, a cross narrow in the center, and broad at the extremities, otherwise called *patée*. See the article **PATÉE**.

**FORMED**, or **FIGURED STONES**, among naturalists. See the article **STONE**.

**FORMED**, in heraldry, the same with seated. See the article **SEATED**.

**FORMEDON**, in law, a writ that lies for a person who has a right to lands or tenements, by virtue of any intail, arising from the statute of Westm. 2 Ch. II.

This writ is of three kinds, *viz.* a descender, remainder, and reverter. **Formedon** in descender, lies where a tenant in tail infeoffs a stranger, or is disseised and dies, the heir may bring this writ to recover the land. **Formedon** in remainder, lies where a man gives lands, &c. to a person in tail, and for default of issue of his body, the remainder to another in tail: here if the tenant in tail die without issue, and a stranger abates and enters into the land, he in remainder shall have this writ. **Formedon** in reverter, lies where lands are intailed on certain persons and their issue, with remainder over for want of issue, and on that remainder failing, then to revert to the donor and his heirs: in this case, if the tenant in tail dies without issue, and also he in remainder, the donor and his heirs, to whom the reversion returns, may have this writ for the recovery of the estate, tho' the same be aliened, &c.

**FORMERS**, in gunnery, round pieces of wood, fitted to the diameter of the bore of a gun, chiefly used for making cartridges.

On these formers, the paper, parchment, or cotton, which is to make the cartridge, are rolled before it be sewed.

**FORMICĀ,**

**FORMICA**, the **ANT**, in zoology. See the article **ANT**.

**FORMICA**, in medicine, a callous sort of wart, more usually called myrmecia. See the article **MYRMECIA**.

**FORMICA-LEO**, the **ANT-LION**, or **ANT-EATER**, in zoology, an insect so called from its devouring great numbers of ants. It is the caterpillar or worm of a fly much resembling the libellæ, or dragon-flies.

The address of this insect in catching the ants, is admirable; it makes a hole of a conical or funnel-shape, in the loose sand; and is sure to catch all the ants that come within the verge of this hole, by throwing up sand on them, whereby they are forcibly carried into the power of the enemy at the bottom of the hole.

**FORMICATION**, a term used among builders for arching or vaulting.

**FORMING** of a *siege*, in the military art. See the article **SIEGE**.

**FORMING**, in grammar. See the article **FORMATION**.

**FORMOSA**, an island in the Pacific ocean, between  $119^{\circ}$  and  $122^{\circ}$  of east longitude, and between  $22^{\circ}$  and  $25^{\circ}$  north latitude, about 100 miles east of Canton in China. It is subject to the Chinese.

**FORMULA**, or **FORMULARY**, a rule or model, or certain terms prescribed or decreed by authority, for the form and manner of an act, instrument, proceeding, or the like.

**FORMULA**, in church history and theology, signifies a profession of faith. See the article **FORM**.

**FORMULA**, in medicine, imports the constitution of medicines, either simple or compound, both with respect to their prescription and consistence. Paracelsus calls red and clear urine, formula urinæ.

**FORMULARY**, a writing containing the form of an oath, declaration, attestation, abjuration, &c. to be made on certain occasions.

**FORNACALIA**, or **FORNICALIA**, in roman antiquity, a festival instituted by Numa in honour of Fornax, the goddess of ovens; wherein certain cakes were made, and offered in sacrifice before the ovens.

**FORNICATION**, the act of incontinency between single persons; for when either of the parties is married, such act is adultery. See the article **ADULTERY**.

The spiritual court now has the sole cognizance of this offence, which antiently was cognizable in other courts, as the

court-leet, &c. in which the king had a fine assessed on the offenders.

**FORNICATION** is sometimes also used as a generical term, including all kinds of offences against chastity.

**FORNIX**, in anatomy, a part of the brain placed under the septum lucidum, and, like it, composed of a medullary substance. Its anterior part rises with a double base, but the two parts soon unite: the hinder part is likewise bifid, and thence called crura fornicis, and by some, pedes hippocampi. See the article **BRAIN**.

**FORPRISE**, in law, signifies an exception or reservation, and is frequently used in leases and conveyances, wherein any exception is inserted; as such a thing excepted and forprised.

**FORRAGE**, in the military art, denotes hay, oats, barley, wheat, grafs, clover, &c. brought into the camp by the troopers, for the sustenance of their horses.

Dry forrage is the hay, oats, &c. delivered out of the magazines, to an army in garrison, or when they take the field, before the green forrage is sufficiently grown up to supply the troops.

It is the business of the quarter master-general to appoint the method of forrage, and post proper guards for the security of the forragers. He ought also, in encamping an army, to take care that it be in a country abounding with forrage.

*Ration* of **FORRAGE**. See **RATION**.

**FORRES**, a parliament-town of Scotland, in the county of Murray, about thirteen miles west of Elgin: west long.  $3^{\circ} 20'$ , and north lat.  $57^{\circ} 40'$ .

It is classed with Inverness, Fortrose, and Nairn. See the article **BOROUGH**.

**FORSES**, a name used in some parts of the kingdom for a cataract, or water-fall. See the article **CATARACT**.

**FORSTALLING**, in law. See the article **FORESTALLING**.

**FORT**, in the military art, a small fortified place, environed on all sides with a moat, rampart, and parapet. Its use is to secure some high ground or the passage of a river, to make good an advantageous post, to defend the lines and quarters of a siege, &c.

Forts are made of different figures and extents, according as the ground requires. Some are fortified with bastions, others with demi-bastions. Some again are in form of a square, others of a pentagon. A fort differs from a citadel, as this last is built to command some town. See the article **CITADEL**.

**Royal FORT**, one whose line of defence is at least twenty-six fathoms long.

To fortify a square fort, having inscribed the square in a circle. 1. Divide each of its sides AB, BD, &c. (plate CII. fig. 2. n° 1.) into two equal parts, in the point F. 2. From the center E, draw an indefinite line EF. 3. From the center draw also the lines EA, EB, ED, EC, to the angles of the square. 4. Divide the side AB into eight equal parts. 5. Let one of these parts be laid off from F to G, and from G draw the lines of defence AG, BG. 6. Divide another side of the square into seven equal parts. 7. Lay off two of these parts from A to K, and from B to L, which will be the faces of the bastions. 8. Take the distance KL in your compasses, and lay it off the lines of defence from K to H, and from L to I; and drawing HI, it will be the curtain; and the lines KI, LH, will be the flanks. See another method of fortifying a square, *ibid.* n° 3. Also two different methods of fortifying a triangle, *ibid.* n° 4 and 5.

**Star-FORT**, a redoubt formed by a number of re-entering and salient angles, the sides of which flank each other. See plate CII. fig. 2. n° 2.

To describe a star-fort, 1. Draw a hexagon *ABCDEF*. 2. Divide one of its sides BC into four equal parts. 3. Upon the middle of this side, raise the perpendicular DA, equal to  $\frac{1}{4}$  of the side BC, from D to A. 4. From the point A, draw the faces AC, AB. Let the same operations be performed with respect to the other sides of the hexagon, and you will have the star-fort required.

**FORTAMENTE**, in music, the same with forte. See the article FORTE.

**FORTAVENTURA**, one of the Canary-islands, subject to Spain: west long.  $14^{\circ}$ , and north lat.  $27^{\circ}$ .

**FORTE**, or **FORTAMENTE**, in music, directs to play strong and loud; and forte forte, or *piu forte*, signifies a degree louder and stronger than forte alone.

**FORTIFICATION**, the art of fortifying a town, or other place; or of putting them in such a posture of defence, that every one of its parts defends, and is defended by some other parts, by means of ramparts, parapets, moats, and other bulwarks; to the end, that a small number of men within, may be able to defend themselves for a considerable time against the assaults of a numerous army without;

so that the enemy, in attacking them, must of necessity suffer great loss.

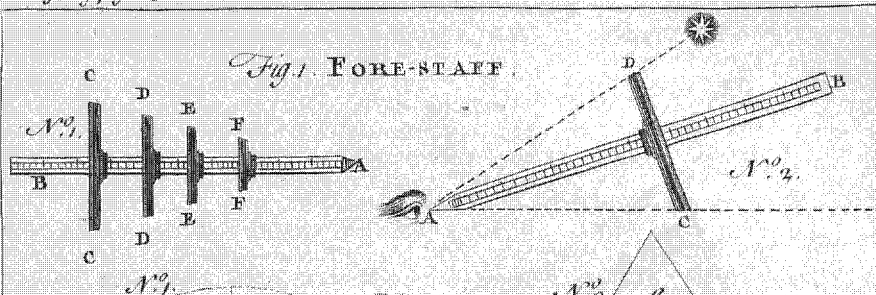
Fortification is either antient or modern, regular or irregular. Antient fortification, at first, consisted of walls or defences made of trunks, and other branches of trees, mixed with earth, to secure them against the attacks of the enemy. This was afterwards altered to stone-walls, on which were raised breast-works, behind which they made use of their darts and arrows in security. Modern fortification, is that which is flanked and defended by bastions and out-works, the ramparts of which are so solid, that they cannot be beat down but by the continual fire of several batteries of cannon. Regular fortification, is that built in a regular polygon, the sides and angles of which are all equal, being commonly about a musket-shot from each other. Irregular fortification, on the contrary, is that where the sides and angles are not uniform, equidistant, or equal; which is owing to the irregularity of the ground, valleys, rivers, hills, and the like. See **BASTION**, &c.

The principal maxims of fortification are these: 1. That every part of the works be seen and defended by other parts, so that the enemy can lodge nowhere without being exposed to the fire of the place. 2. A fortress should command all places round it; and therefore all the out-works ought to be lower than the body of the place. 3. The works farthest from the center, ought always to be open to those more near. 4. No line of defence should exceed a point blank musket-shot, which is about an hundred and twenty or an hundred and twenty-five fathoms. 5. The more acute the angle at the center is, the stronger will be the place. 6. In great places, dry trenches are preferable to those filled with water, because sallies, retreats, and succours are frequently necessary; but, in small fortresses, water-trenches that cannot be drained, are best, as standing in need of no sallies, &c.

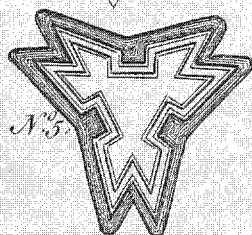
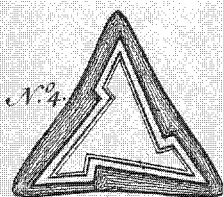
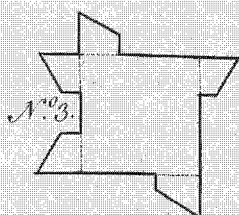
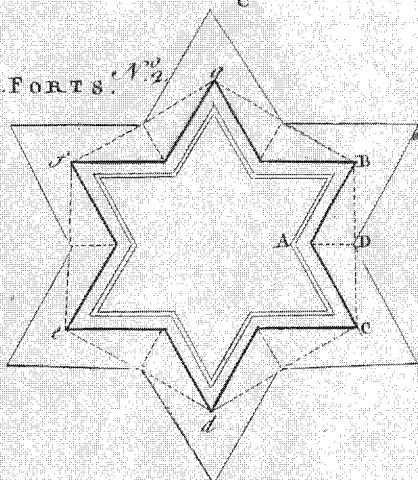
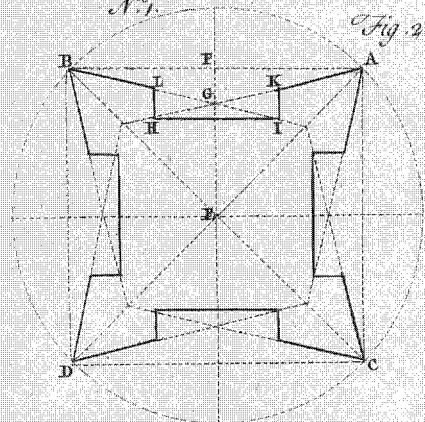
Different authors recommend different methods of fortification; but the principal are those of Pagan, Blondel, Vauban, and Scheiter.

Fortification, according to the method of count Pagan, supposes the side AB (plate CII. fig. 3.) of the external polygon, in larger fortifications, 100 perches; in the smaller, 80; and in those of middle

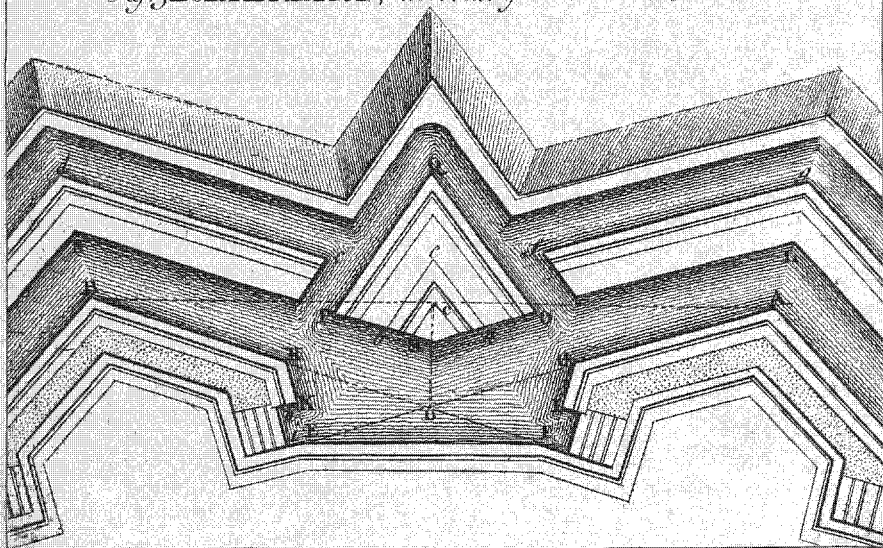
*Fig. 1. FORE-STAFF.*



*Fig. 2. FORTS. N° 2.*



*Fig. 3. FORTIFICATION, according to Count PAGAN.*



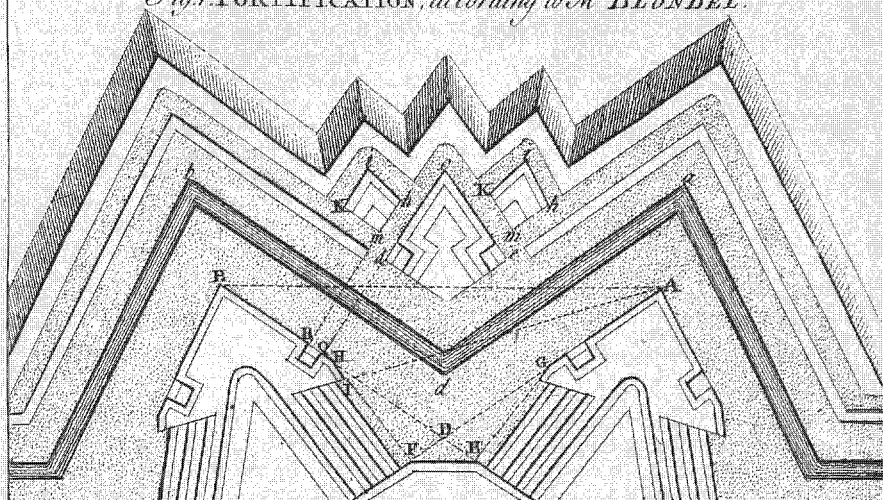
*Aggierre sculp.*







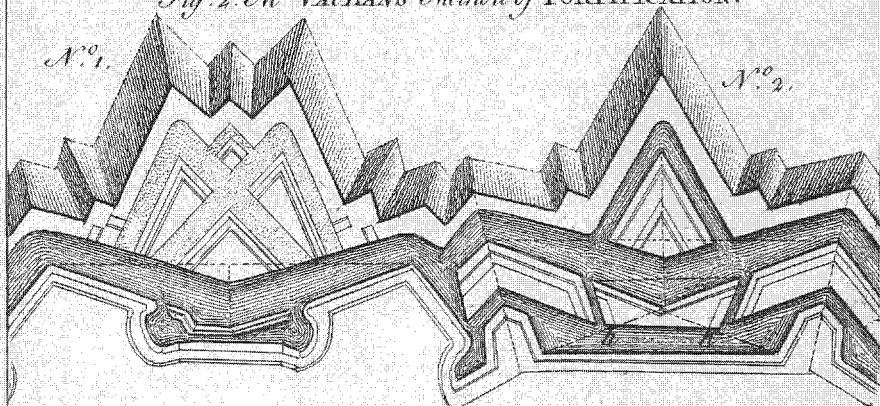
*Fig. 1. FORTIFICATION, according to M<sup>r</sup> BLONDEL.*



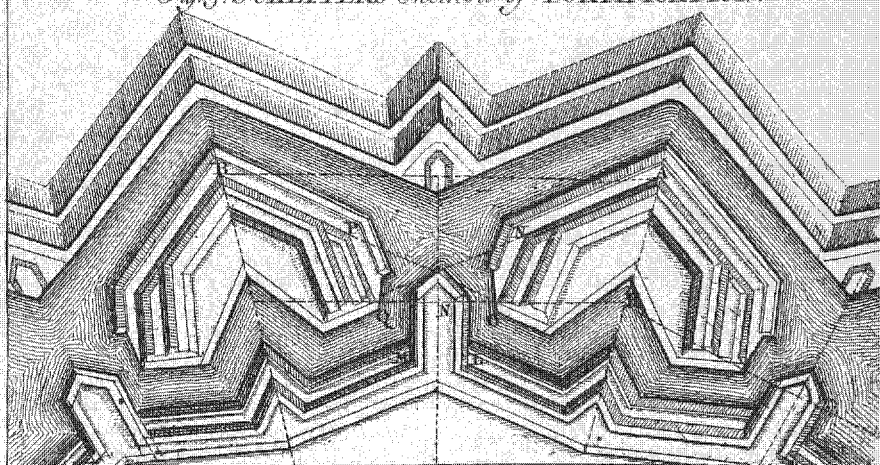
*Fig. 2. M<sup>r</sup> VAURAN'S Method of FORTIFICATION.*

*N<sup>o</sup> 1.*

*N<sup>o</sup> 2.*



*Fig. 3. SCHEITER'S Method of FORTIFICATION.*



*J. Gifford del.*

die size, 90; with the corresponding faces, 30, 25, and  $27\frac{1}{2}$ ; the perpendicular, CD, being in all of them 15. Here too the flanks GF, HE, are perpendicular to the lines of defence, AE and BE: these flanks are also covered with an orillon and threefold. LMN is the boundary of the moat, parallel to the faces AG, BH. The curtain is defended by a double ravelin, OQP being the external one, and acb the internal; the faces of the bastions being likewise defended by counter-guards *gf, ed*. This method, though received with great applause, is not without its defects. It is not only very expensive, but its threefold flanks are too close, so as to be too much exposed to bombs; the largeness of the orillons is prejudicial to the length of the flanks, and the outer rampart is too thick.

Mr. Blondel's method of fortification has a great affinity with that of count Pagan, only that the lines and angles are otherwise determined. Thus by subtracting a right angle from that of the polygon, and adding 15 to a third part of the remainder, you find the quantity of the diminished angle ABE. In the greater fortifications, the side AB (plate CIII. fig. 1.) of the outer polygon is 100 perches, in the lesser only 85; and AB being divided into ten equal parts, seven of them give the lines of defence AF, BE. The faces of the bastions AG, BH, are equal to half those of the tenaille AD, BD. In these faces is a kind of flanking batteries QR, to defend the faces of the ravelin *ecd*. The flanks HF, GE, are threefold, as in count Pagan's method; and in the middle of the moat is a deep trench *adb*. The other out-works are as represented in plate CIII. fig. 1.

Fortification, according to Vauban's method, supposes the outer polygon to be 100 perches in larger places, 80 in smaller ones, and 90 in those of a middle size. The faces are made  $\frac{2}{3}$  of the same, the perpendicular  $\frac{1}{8}$  in a square,  $\frac{1}{7}$  in a pentagon, and  $\frac{1}{6}$  in other polygons. He also makes the complement of the face to the line of defence, equal to the distance of the epaule; uses re-entering crooked flanks, and places a low tenaille before the curtain. See plate CIII. fig. 2. n° 1.

This method of fortification is much tried up by many, both as it increases the

strength without much expence, and agrees very well with the maxims above laid down. Its greatest fault lies in this, that the faces lie altogether exposed to the enemy.

Vauban's new method places large bastions before small ones; the curtain being covered with a low tenaille and a double ravelin, *ibid*. n° 2.

Fortification, according to Scheiter's method, supposes the external side AB, (plate CIII. fig. 3.) in large fortifications, 100 perches; in lesser ones, 80; and in those of middle size, 90. The flanks NO, PQ, are perpendicular to the lines of defence AQ, BO; which in greater fortifications are 70, in lesser 60, and in those of middle size, 65 perches: these detach the bastions from the curtain, and form a kind of inner recess behind the curtain. The angle of the bastion in a square, is  $64^{\circ}$ ; in a pentagon,  $72^{\circ}$ ; in a hexagon,  $78^{\circ}$ ; in a heptagon,  $83^{\circ}$ ; and in works of more sides, this angle is found by adding  $2^{\circ}$  for every side above the heptagon.

As to the out-works, they are much the same as in the preceding methods, only that the covert-way is double; as is the ravel, which covers the curtain.

To lay down the plan of a regular fortification. 1. Measure exactly the circuit of the place to be fortified, at about twelve paces distance from the houses; and dividing the whole circuit by 150 geometrical paces at least, or 180 at most, the quotient will give the number of the bastions, in such a manner that their lines of defence shall not exceed the carriage of a musket-shot. 2. Inscribe in a circle a polygon with as many sides as the place is to have bastions; and from the center A (plate CIV. fig. 1.) through the angle B of the polygon, draw lines at pleasure, which lines are called principals. Afterwards take  $Ba = \frac{1}{3}$  of the side of the polygon, and  $Bf = \frac{1}{5}$ ; then drawing the lines of defence Fga, Fga, from each point *a* raise perpendiculars; which meeting the lines of defence in the points *g, g*, will form the bastions *agFga, agF, &c*. 3. Having thus described the outward circuit of the rampart, draw lines *e, e, e*, parallel to the faces of the bastions Fg, Fg, Fg: these will determine the outward circuit of the moat, which ought to be rounded before the angles of the bastions F, F. 4. To finish the plan, draw within the place lines parallel to those which form the outward

outward circuit of the rampart, at the distance of  $\frac{1}{3}$  of the flank for the parapet; at the distance of  $\frac{1}{2}$  the demigorge *Ba*, for the rampart; and at the distance of five feet from the parapet, for the banquet. In the same manner, on the outside of the moat, must be drawn lines parallel to its outward circuit, at the distance of  $\frac{1}{4}$  of the flank for the covered way; and at the distance of  $\frac{2}{3}$  of the flank for the glacis.

To lay down the profile of these works. Let *ARR* (plate *CIV*. fig. 2.) represent the level of the place; take *AB*, 5 paces, for the place of arms; the perpendicular *OC*, 16 feet, for the talus or slope; the thickness of the lower part of the rampart, *BR*, 12 paces; the upper part, *CD*,  $6\frac{2}{3}$  paces; the banquet, *dD*, 6 feet; the thickness of the lower part of the parapet *DV*,  $3\frac{1}{3}$  paces; the upper, at *E*,  $2\frac{1}{3}$  paces; its inward height, *ED*, 6 feet; and its outward height, 5 feet; the talus of the rampart to the moat, *GR*, 7 feet; the talus of the scarp, *xy*, 2 paces; the depth of the moat, *Rx*, 16 feet; the width of its channel, *T*, 15 feet; the talus of the counterscarp, *aK*, 10 feet; and the banquet of the covered way, at *L*, 5 feet. Then follows the palisade at *N*, and the glacis or esplanade, *M*. In plate *CIV*. fig. 3. is represented a hexagon fortified with all the kinds of out-works, together with the manner of carrying on the trenches of approach. Here is also delineated a pentagonal citadel, with its out-works. The names of the different works and parts of this fortification, are these; *a, a, a*, &c. represent the declivity or slope, usually called glacis; *b, b, b*, &c. the covert way; *c, c, c*, &c. the counterscarp; *d*, a single tenaille; *e*, a double tenaille; *f*, a horn-work; *g, g, g*, &c. places of arms; *h, h, h*, &c. the moat or ditch; *i, i, i*, &c. ravelins; *k, k, k*, &c. half moons; *l*, a crown-work; *m*, a bonnet or priest's cap; *n, n*, a counter-guard; *o, o, o*, &c. bastions; *p, p, p*, bastions with circular flanks; *q, q*, the curtain; *r, r, r*, &c. the ramparts; and *s, s, s*, &c. bridges over the moat. With respect to the approaches, *1, 1, 1*, &c. represent the trenches; *2, 2, 2*, &c. the lines of communication; *3, 3*, batteries; *4, 4, 4*, &c. forts for the defence of the trenches; *5*, the descent into the covered way; and *6*, a mine.

**Irregular FORTIFICATIONS**, are those raised about irregular polygons; in which the en-

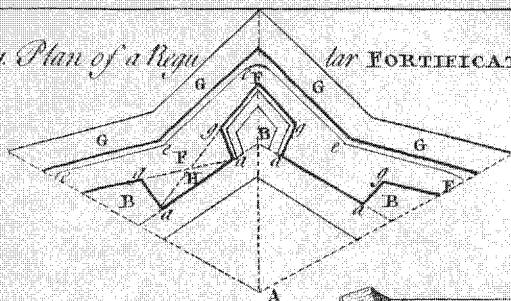
gineer ought to follow, as much as possible, the proportions laid down for the regular ones. If bastions are found too high to sweep the circumjacent campaign, a second bastion must be added to the first, or even a third, if necessary; still taking care that their faces be well defended. If, on the contrary, a bastion is too low, a cavalier must be raised on it. It will sometimes also happen, that the faces of bastions would become excessive long, if they were to be extended till they meet; in which case, they are usually closed with a re-entering angle, (*ibid*. fig. 4.) When one side of the polygon is long enough to admit of a bastion in its middle, it is remedied by raising one; but if it will not admit of this, it may be remedied by forming a salient angle in the middle; or by advancing the neighbouring bastions nearer to each other, so that both may be entirely formed upon that side. When a long extended side of a place cannot admit of bastions, as being cut off by a river, or stands upon a deep ascent, it may be fortified with redents or re-entering angles, not unlike the teeth of a saw. See plate *CIV*. fig. 5. But the defect of these redents is, that both the sides of the tenaille or front of a place, may be ruined from one battery; so that the besiegers may then make an assault without fear of being enfiladed.

**Marine FORTIFICATIONS**. Though these have nothing peculiar in them, yet it may not be improper to give some directions with relation to batteries. 1. In raising batteries to hinder a descent, care should be taken to dispose them in such places where the descent is most easy; and the guns should be so levelled, as to scour the surface of the water, that they may fire effectually upon the boats as they approach. 2. It is likewise convenient to have batteries to play upon places where there is good anchorage; and these should be somewhat more elevated than the former. 3. It is also necessary to erect batteries at the entrance of roads; and these ought to be so made, as to discover ships at a distance. 4. It is very necessary that these batteries should be defended by some works, against attacks; and, if possible, should be under the fire of the place; or, at least, they ought not to be too far advanced.

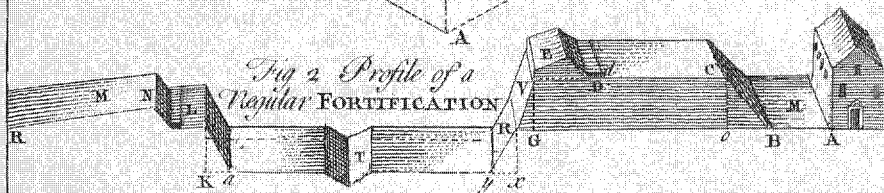
**FORTIFIED**, an appellation given to places defended by ramparts, bastions, ditches, covert-ways, half-moons, ravelins, tenailles, and other out-works.

See

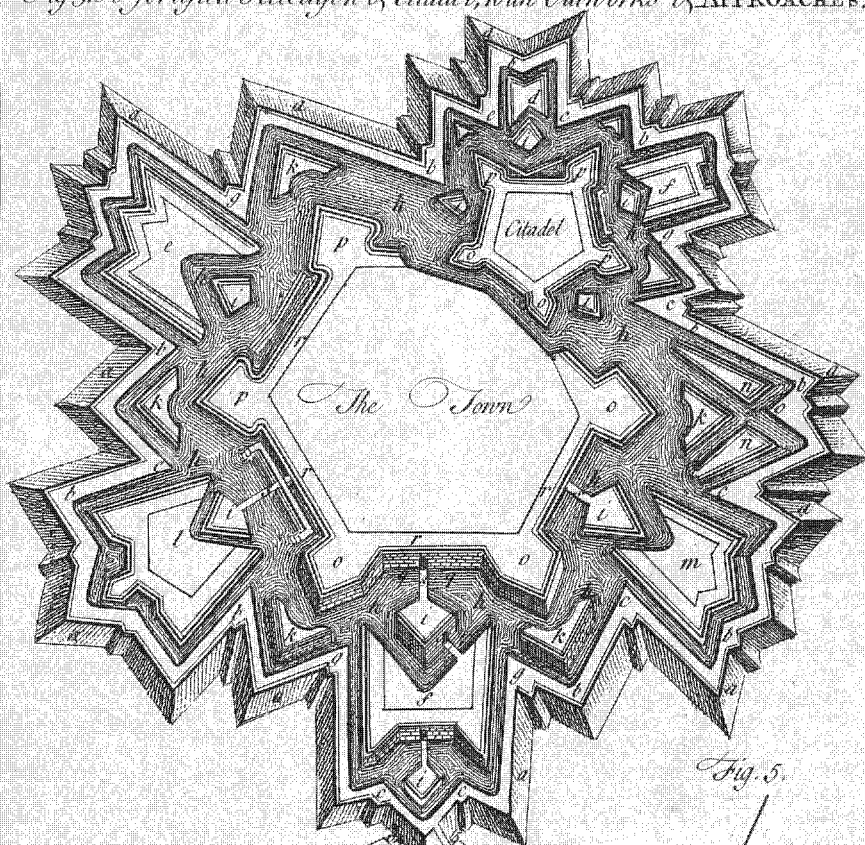
*Fig. 1 Plan of a Regular FORTIFICATION.*



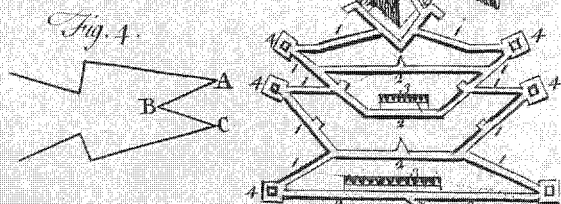
*Fig. 2 Profile of a Regular FORTIFICATION.*



*Fig. 3. A fortified Hexagon & Citadel, with Outworks & APPROACHES.*



*Fig. 4.*



*Fig. 5.*



*J. Gifford sculp.*



See the articles RAMPART, BASTION, &c. and the preceding article.

**FORTIN**, **FORTLET**, or *field-FORT*, a sence or little fort, whose flanked angles are generally distant one from another 120 fathoms. See the article **FORT**.

The extent and figure of fortins are different, according to the situation or nature of the ground; some of them having whole bastions, and others demi-bastions. They are made use of only for a time, either to defend the lines of circumvallation, or to guard some passage or dangerous post.

**FORTIORI**, or *a multo FORTIORI*. See the article **MULTO**.

**FORTIS AQUA**. See the article **AQUA**.

**FORTISSIMO**, in music, sometimes denoted by **FFF**, or *fff*, signifies to sing or play very loud or strong.

**FORT-LEWIS**, a fortress of Alsace, in Germany, situated on the western shore of the Rhine, subject to France: east long. 8°, and north lat. 48° 46'.

**FORTUNA**, in our antient law-books, is the same with what we call treasure-trove. See the article **TREASURE-TROVE**.

**FORTUNA EQUESTRIS**, in roman antiquity, a statue of the goddess Fortune, mounted on horseback in the middle of the city.

**FORTUNATE-ISLANDS**, in antient geography, certain islands concerning the situation of which authors are not agreed, famous for the golden apples of the Hesperides. See the article **HESPERIDES**. The common opinion is, that they are the same with the Canary-islands. See the article **CANARY**.

**FORTUNE**, *fortuna*, a goddess worshiped with great devotion by the antient Greeks and Romans, who believed her to preside over human affairs, and to distribute wealth and honour at her pleasure.

The Greeks had a great number of temples dedicated to Fortune, under the name of *τυχη*. The poet Pindar makes her one of the parçæ, or destinies, and the daughter of Jupiter. Ancus Martius, king of the Romans, was the first who built a temple at Rome to this deity, under the name of *fortuna virilis*, on account that courage, no less than good fortune, is requisite to obtain a victory. Servius Tullus built a temple to fortune, under the name of primogenia. The Romans gave several other appellations to fortune; such as *fortuna libera*, *redux*, *publica*, &c. There was a statue of Fortune at Athens, holding betwixt her arms Plutus the god

of riches. Pausanias says, that her most antient form was that which Bupalus made in Greece, in shape of a woman with a round ball on her head, and a cornucopia under her arm. Macrobius says, that she was first set forth with wings on her shoulders, having by her side the rudder of a ship; and that she was placed upon a wheel, and held in her right hand a golden ball, and in her left a whip. In Ægypt she was painted like a woman, turning a great glass wheel, on whose top were represented a great number of men playing, others climbing up, and others, having attained the summit of the wheel, precipitating themselves, and falling down again. Modern painters represent Fortune by a naked woman, standing on a globe, with a bandage on her eyes. Horace's description of this goddess, and her great power, may be seen in ode xxxv. lib. i. Juvenal, in Satire x. v. 365. calls Fortune the deity of fools.

**FORTY-SHILLING LAND**, a certain quantity of arable land; that of old extent, containing eight ox-gang, or an hundred and four acres.

**FORUM**, in roman antiquity, a public standing place within the city of Rome, where causes were judicially tried, and orations delivered to the people.

There were six of these forums, *viz.* the Romanum, Julianum, Augustum, Palladium, Trojanum, and Salustii forum. The first and most eminent of these was the Forum Romanum, called absolutely the Forum. In this was an apartment called the rostra, where the lawyers pleaded, and the orators harangued the people, &c. Here was also the comitium, or hall of justice, with the sanctuary of Saturn, the temple of Castor, &c. All the compass of the forum was arched with porticos, some passages being only left for places of entrance.

**FORUM**, was also used for a place of traffic, answering to our market-place: of these there were vast numbers, as the *forum piscarium*, *olitorium*, &c. These were generally called *fora venalia*, in contradistinction to the former, which were called *fora civilia*.

**FORUM**, is also used, among cauists, &c. for jurisdiction, thus they say, *In fora legis*, &c.

**FOSS**, or **FOSSA**, in anatomy, a kind of cavity in a bone, with a large aperture, but no exit or perforation.

**Foss** is particularly used for the cavity, or indenture, in the back part of the neck.

**Fossa magna**, the interior cavity, or rima magna, of the pudendum muliebre. Bartholin calls it fossa navicularis. This cavity appears, upon opening the labia; it has the carunculæ myrtiformes in the middle of it. See the article **CARUNCULÆ MYRTIFORMES**.

**Foss**, in fortification, a hollow place, commonly full of water, lying between the scarp and counterescarp, below the rampart; and turning round a fortified place or a post, that is to be defended. See the article **MOAT**.

**Fossa**, in our antient customs, was used to signify a ditch full of water, wherein women, convicted of felony, were drowned. See the article **FURCA**.

**Foss-way**, one of the four principal highways of England, that antiently led through the kingdom; supposed to be made by the Romans, having a ditch upon one side thereof.

**FOSSANO**, a town of Piedmont, nineteen miles south-east of Turin.

**FOSSARII**, in antiquity, a sort of officers in the eastern church, whose business it was to inter the dead.

St. Jerom assures us, that the rank of the fossarii held the first place among the clerks: but he is to be understood of those clerks only who had the direction and intendance of the interment of the devout. Some authors insinuate, that the fossarii were instituted in the time of the apostles.

**FOSSATORUM operatio**, signifies the foss-work; or the service of labouring performed by inhabitants, and adjoining tenants, for the repair and maintenance of the ditches round a city or town. The contribution towards this work was termed *Fossagium*.

**FOSSIGNY**, a county in the dutchy of Savoy. See the article **SAVOY**.

**FOSSIL**, in natural history, denotes, in general, every thing dug out of the earth, whether they be natives thereof, as metals, stones, salts, earths, and other minerals; or extraneous, reposit in the bowels of the earth by some extraordinary means, as earthquakes, the deluge, &c. See the articles **METAL**, **STONE**, &c.

Native fossils, according to Dr. Hill, are substances found either buried in the earth, or lying on its surface, of a plain simple structure, and shewing no signs of containing vessels or circulating juices. These are subdivided, by the same au-

thor, 1. Into fossils naturally and essentially simple. Of these, some are neither inflammable, nor soluble in water, as simple earths, talcs, fibriaræ, gypsum, selenitæ, crystal, and spars; others, tho' uninflammable, are soluble in water, as all the simple salts; and others, on the contrary, are inflammable, but not soluble in water, as sulphur, auripigmentum, zarnich, amber, amber-grease, gagates, asphaltum, ampelites, lithanthrax, naphtha, and pissasphalta. 2. The second general subdivision of fossils comprehends all such as are naturally compound, but unmetallic.

Of these, some are neither inflammable, nor soluble in water, as compound earths, stones, septariæ, siderochita, scrupi, semipellucid gems, lithidia, conissalæ, and pellucid gems; others are soluble in water, but not inflammable, as all the metallic salts; and, lastly, some are inflammable, but not soluble in water, as the marcasites, pyritæ, and phlogonia.

3. The third, and last, general division of fossils comprehends all the metallic ones; which are bodies naturally hard, remarkably heavy, and fusible in fire. Of these, some are perfectly metallic, as being malleable when pure; such are gold, lead, silver, copper, iron, and tin: others are imperfectly metallic, as not being malleable even in their purest state, such are antimony, bismuth, cobalt, zinc, and quicksilver, or mercury. Of all which substances the reader will find a particular description under their respective heads, **EARTH**, **TALC**, **FIBRIARÆ**, **GYPNUM**, &c.

Extraneous fossils are bodies of the vegetable or animal kingdoms accidentally buried in the earth. Of the vegetable kingdom, there are principally three kinds, trees or parts of them, herbaceous plants, and corals; and of the animal kingdom there are four kinds, sea-shells, the teeth or bony palates, and bones of fishes, complete fishes, and the bones of land animals. See the articles **TREE**, **WOOD**, **PLANT**, **SHELL**, &c.

As to the reason why these extraneous fossils come to be lodged in the bowels of the earth, the common opinion is, that this great change was effected by the universal deluge. See **DELUGE**.

**FOSSOMBRONE**, a city and bishop's see of Italy, ten miles south-east of Urbino.

**FOTHER**, or **FODDER**, in mining. See the article **FODDER**.

**FOTUS**, a fomentation. See the article **FOMENTATION**.



**FOVEA CORDIS**, in anatomy, the pit of the heart, or rather of the stomach.

**FOUGADE**, or **FOUGASSE**, in the art of war, a little mine, about eight or ten feet wide, and ten or twelve deep, dug under some work or post, which is in danger of falling into the enemies hands; and charged with sacks of powder, covered with stones, earth, and whatever else can make great destruction. It is set on fire like other mines, with a saucisse.

**FOUGIERES**, a town of Britany, in France, thirty-five miles south east of St. Malo.

**FOUL**, or **FOULE**, in the sea-language, is used when a ship has been long untrimmed, so that the grafs-weeds, or barnacles grow to her sides under water. A rope is also foul when it is either tangled in itself, or hindered by another, so that it cannot run, or be over-hawled.

**FOUL** imports, also, the running of one ship against another. This happens sometimes by the violence of the wind, and sometimes by the carelessness of the people on board, to ships in the same convoy, and to ships in port by means of others coming in. The damages occasioned by running foul, are of the nature of those in which both parties must bear a part. They are usually made half to fall upon the sufferer, and half upon the vessel which did the injury: but in cases where it is evidently the fault of the master of the vessel, he alone is to bear the damage.

**FOUL-WATER**. A ship is said to make foul-water, when being under sail, she comes into such shoal-water, that tho' her keel do not touch the ground, yet it comes so near it, that the motion of the water under her, raises the mud from the bottom.

**FOUL** is also a disease in cattle, proceeding from blood, and a waterish rheum that falls down into the legs, and makes them swell. See *Swelled LEGS*.

**FOULNESS**, in surgery, a term applied to wounds, where the flesh is putrid, fungous, black or livid. Wounds must be well cleansed before any attempts are made to heal them. For which intention the antients used honey, but the moderns apply a digestive ointment made of turpentine dissolved in the yolk of an egg, and afterwards mixed with honey of roses; but where this is not found strong enough for the purpose, they substitute the egyptian ointment, mixed

either with spirit of wine, or with the common digestive. To these digestive ointments, a small quantity of aloes or myrrh may be added, and where more strength is required, a small quantity of red precipitate. The use of lime-water as a detergent is also known to be very beneficial, especially if there be added to every pint of it, twenty or thirty grains of sublimate, which from its known efficacy is called by the surgeons phagedenic-water. Applications of this kind are to be continued till the wound is intirely clean, and then it is to be healed with the common digestives. See the article **WOUND**.

**FOUMART**, a name used in some parts of the kingdom for the mustela, or weasel. See the article **MUSTELA**.

**FOUNDATION**, in architecture, is that part of a building which is underground. See **BUILDING**.

Foundation, called by Daviler, *Fondation*, is the coffer or bed dug below the level of the ground to raise a building upon, in which sense the foundation either goes to the whole area of the building, as when there are to be vaults, cellars, &c. or it is drawn in trenches, as when only walls are to be raised. The foundation, *Fondement*, according to the same author, is properly so much of the masonry as reaches as high as the surface of the ground, and ought always to be proportioned to the load or weight of the building that it is to bear. Sometimes the foundation is massive, and continued under the whole building, as in the antique arches and aqueducts, and some amphitheatres; but it is more usually in spaces or intervals, either to avoid expence, or because the vacuities are at too great a distance, in which latter case they make use of insulated pillars bound together by arches.

Palladio allows a sixth part of the height of the whole building for the hollowing or under-digging, unless there be cellars or under-ground, in which case he would have it somewhat lower, and as to thickness, double the width of a wall is no bad rule. Palladio also lays down several rules to know if the earth be firm enough for the foundation, by observations from the digging of wells, and the like; but the best way to discover the nature of the soil is to try it with an iron-crow, or else with a borer, such as is used by well-diggers.

Foundations are either natural or artificial

ificial Natural as when we build upon a rock, or very solid earth, in which case we need not seek for any further strengthening; for these, without digging, or other artificial helps, are of themselves fit to uphold the greatest buildings. But if the ground be sandy, or marshy, or have lately been dug, recourse must be had to art. If the ground be sandy or marshy, you must dig till you find sound ground, and the best is that which requires most labour in cutting, and when wet, does not dissolve into dirt. If the earth to be built upon is very soft, as in moorish grounds, lay good pieces of oak whose length must be about the breadth of the trench, or two feet longer than the breadth of the wall, across the foundation, about two feet asunder, and being well rammed down, lay long planks upon them, pinning or spiking down each plank to the pieces of oak on which it lies. But if the ground be very bad, let piles of oak of a diameter about one twelfth part of their length be drove down to reach the good ground, and placed as close as one can stand by another; then spike down long planks upon them. And it must not be forgot to place the piles not only under the outer walls, but also under the inner walls that divide the building; for if these should sink, it would make the outer wall crack, and so ruin the whole building. If the ground be faulty here and there, let arches be turned over the faulty places, which will discharge them of the weight. As to the rules necessary to be observed in the substruction or artificial part of the foundation, they are these, 1. That the bottom of the trench be made exactly level. 2. That the lowest ledge or row be all of stone (the broader the better) laid close together. 3. That the breadth of the ground-work be at least double that of the wall to be raised on it. However, the breadth may be regulated according to the goodness of the ground, and the weight of the intended edifice. 4. That the foundation be made to diminish as it rises, taking care, however, that it do so equally on both sides. 5. That you ought never to build on the ruins of an old foundation, unless well assured of its depth and strength to bear the superstructure. 6. And lastly, The stones in a foundation should be laid as they naturally lay in the quarry, a precept generally observed by all good architects, because they find the stones

are subject to cleave that way of the grain that lay horizontally in the quarry. In some places, buildings near the water are founded on sacks of wool laid like matresses, which being well pressed and greasy, will never give way, nor rot in the water.

*Foundation of Bridges*, is laid after different manners. The first is by enclosing all round the space of ground you would build upon, by dams made with piles set deep in the ground in double rows, well strengthened and bound together with cross pieces and cords, and filling the vacant spaces between them with chalk or other earthy matter. This being done, the water must be emptied out, and the foundation dug according to the quality of the ground, driving down piles, if it be necessary, upon which the walls of the foundation must be laid. But this method is only practicable in building on such rivers, where the water is neither very rapid, nor very deep. The second is done by laying the foundation on grate-work, rafts of stout oak well bound together, and made fast at the surface of the water with cables or machines, and building upon them large quarters of stone, cramped together, and joined with good mortar, or cement, and afterwards letting them descend softly by these cables and machines perpendicularly to the bottom of the water. This was the method practised in laying the foundation of Westminster-Bridge, the grating being made of the bottom of a frame called by the French *Caisson*, the sides of which were so contrived, that they might be taken off, after a pier was finished. The third is by drawing off all, or the greatest part of the water of the river into some other place; and this was done at London-Bridge, if we could believe Stow, who alleges, that during the time of building, the river was turned from Battersea to Rotherhith: but this is not warranted. See further on this subject in Belidor's *Architect. Hydraulique*. Livre iv. ch. 11, and 12.

**FOUNDATION** denotes also a donation or legacy either in money or lands, for the maintenance and support of some community, hospital, school, lecture, &c.

**FOUNDATION** is also used figuratively for the establishment of a city, empire, or the like.

**FOUNDAY**, in metallurgy, a term used by the workers at the iron-mines in many counties of England, for the space of  
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six days, in which time they contrive to make a determinate quantity of iron ; so that they count their work by these foundays, or weeks.

**FOUNDER**, in a general sense, the person who lays a foundation, or endows a church, school, religious-house, or other charitable institution. The founder of a church may preserve to himself the right of patronage, or presentation to the living.

**FOUNDER**, also implies, an artist who casts metals, in various forms, for different uses, as guns, bells, statues, printing characters, candlesticks, buckles, &c. whence they are denominated gun-founders, bell-founders, figure-founders, letter-founders, founders of small works, &c. See the article **FOUNDRY**,

**FOUNDER**, in glass-making, a term appropriated to the green glass, and is the person there, who in the same office in the white-glass making is called conciator. See the article **CONCIATOR**.

**FOUNDER**, in the sea-language, a ship is said to founder, when by an extraordinary leak ; or by a great sea breaking in upon her, she is so filled with water, that, she cannot be freed of it ; so that she can neither veer nor steer, but lie like a log ; and not being able to swim long, will at last sink.

**FOUNDERING**, in the manege, a disorder in horses, whereof there are two kinds, *viz.* in the feet and in the chest.

Foundering in the feet, is an universal rheumatism, or defluxion of humours upon the sinews of a horse's feet, which causes so great a stiffness in the hoofs, that the horse has no sense nor feeling of them.

This disorder arises from hard riding ; from great heats and colds ; and is sometimes occasioned by watering a horse when he is very hot, by which means, as the farriers term it, his grease is melted within him ; also by wearing too strait a shoe, or travelling upon hard ground.

The general methods of curing this distemper are, first to pare all the horse's soles so thin, that you may see the quick ; then bleed him well at every toe ; stop the vein with tallow and rosin ; and having tacked hollow shoes on his feet, stop them with bran, tar, and tallow, as boiling hot as may be ; and this renew once in two days for a week together, after which, let him have good exercise,

&c. or, after he is pared thin, and let blood at his toes, stop his feet with cow's dung, kitchen-fee, tar, and soot, boiled together, and poured boiling-hot into them.

Foundering in the chest, may proceed from crudities in the stomach, or other infirmities, obstructing the passages of the lungs ; and may be discovered by the horse's not being able to bow his joints ; and being once laid, he cannot rise again ; his legs swell, &c.

As a particular remedy for chest-foundering, take five or six pennyworth of oil of peter, and mingle it with an equal quantity of ale, or beer : then rub this mixture with your hand on the part affected ; and cause a red hot fire-shovel to be held before it during the application.

**FOUNDRY**, or **FOUNDRY**, the art of casting all sorts of metals into different forms. It likewise signifies the work-house, or smelting-hut, wherein these operations are performed.

**FOUNDRY of small-works, or casting in sand.** The sand used for casting small works, is, at first, of a pretty soft, yellowish, and clammy nature : but it being necessary to strew charcoal dust in the mould, it at length becomes of a quite black colour. This sand is worked over and over, on a board, with a roller, and a sort of knife ; being placed over a trough to receive it, after it is by these means sufficiently prepared.

This done, they take a wooden board of a length and breadth proportional to the things to be cast, and putting a ledge round it, they fill it with sand, a little moistened, to make it duly cohere. Then they take either wood or metal models of what they intend to cast, and apply them so to the mould, and press them into the sand, as to leave their impression there. Along the middle of the mould is laid half a small brass-cylinder, as the chief canal for the metal to run through, when melted, into the models, or patterns ; and from this chief canal are placed several others, which extend to each model or pattern placed in the frame. After this frame is finished, they take out the patterns, by first loosening them all round, that the sand may not give way.

Then they proceed to work the other half of the mould with the same patterns in just such another frame, only that it has pins, which, entering into holes that

that correspond to it in the other, make the two cavities of the pattern fall exactly on each other.

The frame thus moulded, is carried to the melter, who, after extending the chief canal of the counterpart, and adding the cross canals to the several models in both, and srewing mill-dust over them, dries them in a kind of oven for that purpose.

Both parts of the mould being dry, they are joined together by means of the pins; and to prevent their giving way, by reason of the melted metal passing through the chief cylindrical canal, they are screwed or wedged up like a kind of a press.

While the moulds are thus preparing, the metal is fusing in a crucible of a size proportionate to the quantity of metal intended to be cast.

Some of these small work founder's furnaces are like a smith's forge; others stand a few feet under-ground for the more easily and safely taking out a weighty pot of metal; which is done by means of a circular tongs that grasps round the top of the crucible. When the metal is melted, the workman pours it through the chief canal of each mould, which conveys it to every distinct pattern. See the articles *FLUX* and *FORGE*.

When the moulds are coolish, the frames are unscrewed, or unwedged, and the cast work taken out of the sand, which sand is worked over again for other castings.

**FOUNDRY of statues.** The casting of statues depends on the due preparation of the pit, the core, the wax, the outer mould, the inferior furnace to melt off the wax, and the upper to fuse the metal. The pit is a hole dug in a dry place something deeper than the intended figure, and made according to the prominence of certain parts thereof. The inside of the pit is commonly lined with stone, or brick; or when the figure is very large, they sometimes work on the ground, and raise a proper fence to resist the impulsion of the melted metal.

The inner mould, or core, is a rude mass to which is given the intended attitude and contours. It is raised on an iron-grate, strong enough to sustain it, and is strengthened within by several bars of iron. It is generally made either of potter's clay, mixed with hair, and horse-dung; or of plaster of Paris mixed

with brick-dust. The use of the core is to support the wax, the shell, and lessen the weight of the metal. The iron-bars, and the core are taken out of the bra's figure through an aperture left in it for that purpose, which is soldered up afterwards. It is necessary to leave some of the iron-bars of the core, that contribute to the steadiness of the projecting part, within the bra's figure.

The wax is a representation of the intended statue. If it be a piece of sculpture, the wax should be all of the sculptor's own hand, who usually forms it on the core; though it may be wrought separately in cavities, moulded on a model, and afterwards arranged on the ribs of iron over the grate; filling the vacant space in the middle with liquid plaster and brick-dust, whereby the inner core is proportioned as the sculptor carries on the wax.

When the wax, which is the intended thickness of the metal is finished, they fill small waxen tubes perpendicular to it from top to bottom, to serve both as canals for the conveyance of the metal to all parts of the work; and as vent-holes, to give passage to the air, which would otherwise occasion great disorder, when the hot metal came to encompass it.

The work being brought thus far, must be covered with its shell, which is a kind of crust laid over the wax, and which being of a soft matter, easily receives the impression of every part, which is afterwards communicated to the metal upon its taking the place of the wax, between the shell and the mould. The matter of this outer mould is varied according as different layers are applied. The first is generally a composition of clay, and old white crucibles well ground and sifted, and mixed up with water, to the consistence of a colour fit for painting: accordingly they apply it with a pencil, laying it seven or eight times over, and letting it dry between whites. For the second impression, they add horse-dung, and natural earth to the former composition. The third impression is only horse-dung and earth. Lastly, the shell is finished by laying on several more impressions of this last matter, made very thick with the hand.

The shell, thus finished, is secured by several iron-girts, bound round it, at about half a foot distance from each other,

other, and fastened at the bottom to the grate under the statue, and at top to a circle of iron where they all terminate. If the statue be so big that it would not be easy to move the moulds with safety, they must be wrought on the spot where it is to be cast. This is performed two ways : in the first a square hole is dug under ground, much bigger than the mould to be made therein, and its inside lined with walls of free-stone, or brick. At the bottom is made a hole of the same materials with a kind of furnace, having its aperture outwards : in this is a fire made to dry the mould, and afterwards melt the wax. Over this furnace is placed the grate, and upon this the mould, &c. formed as above. Lastly, at one of the edges of the square pit, is made another large furnace to melt the metal. In the other way, it is sufficient to work the mould above ground, but with the like precaution of a furnace and grate underneath. When finished, four walls are to be run around it, and by the side thereof, a massive made for a melting furnace. For the rest, the method is the same in both. The mould being finished, and inclosed as described, whether under-ground or above it, a moderate fire is lighted in the furnace under it, and the whole covered with planks, that the wax may melt gently down, and run out at pipes contrived for that purpose, at the foot of the mould, which are afterwards exactly closed with earth, so soon as the wax is carried off. This done, the hole is filled up with bricks thrown in at random, and the fire in the furnace augmented, till such time as both the bricks and mould become red hot. After this, the fire being extinguished, and every thing cold again, they take out the bricks and fill up their place with earth, moistened, and a little beaten to the top of the mould, in order to make it the more firm and steady. These preparatory measures being duly taken, there remains nothing but to melt the metal, and run it into the mould. This is the office of the furnace above described, which is commonly made in the form of an oven with three apertures, one to put in the wood, another for a vent, and a third to run the metal out at. From this last aperture, which is kept very close, while the metal is in fusion, a small tube is laid, whereby the melted metal is conveyed into a large earthen basin, over the

mould, into the bottom of which all the big branches of the jets, or casts, which are to convey the metal into all the parts of the mould, are inserted.

These casts, or jets, are all terminated with a kind of plugs, which are kept close, that, upon opening the furnace, the brass, which gushes out with violence, may not enter any of them, till the basin be full enough of matter to run into them all at once. Upon which occasion, they pull out the plugs, which are long iron-rods with a head at one end, capable of filling the whole diameter of each tube. The whole of the furnace is opened with a long piece of iron fitted at the end of each pole, and the mould filled in an instant. This completes the work in relation to the casting part ; the rest being the sculptor's or carver's business, who taking the figure out of the mould, and earth, wherewith it is encompassed, saws off the jets with which it appears covered over, and repairs it with chisels, gravers, punches, &c.

**FOUNDRY OF BELLS.** The metal, it is to be observed, is different for bells, from what it is for statues ; there being no tin in the statue-metal : but there is a fifth, and sometimes more, in the bell-metal. See the article **BELL**.

The dimensions of the core, and the wax, for bells, if a ring of bells especially, are not left to chance, but must be measured on a scale, or diapason, which gives the height, aperture, and thickness necessary for the several tones required. See the article **DIAPASON**.

It is on the wax that the several mouldings and other ornaments are formed to be represented in relievo, on the outside of the bell.

The business of bell-foundry is reducible to three particulars. 1. The proportion of a bell. 2. The forming of the mould ; and, 3. The melting of the metal.

The proportions of our bells differ much from those of the Chinese : in ours the modern proportions are to make the diameter fifteen times the thickness of the brim, and twelve times the height.

There are two kinds of preparations, viz. the simple and the relative : the former are those proportions only that are between the several parts of a bell, to render it sonorous ; the relative proportions establish a requisite harmony between several bells.

The particulars necessary for making the mould of a bell, are, 1. The earth : the most cohesive is the best : it must be well ground and sifted, to prevent any chinks. 2. Brick-stone ; which must be used for the mine, mould, or core, and for the furnace. 3. Horfe-dung, hair, and hemp, mixed with the earth, to render the cement more binding. 4. The wax for inscriptions, coats of arms, &c. 5. The tallow equally mixed with the wax, in order to put a slight lay of it upon the outer mould, before any letters are applied to it. 6. The coals to dry the mould.

For making the mould, they have a scaffold consisting of four boards, ranged upon tressels. Upon this, they carry the earth, grossly diluted, to mix it with horfe-dung, beating the whole with a large spatula.

The compasses of construction is the chief instrument for making the mould, which consist of two different legs, joined by a third piece. And last of all, the founders shelves, on which are the engravings of the letters, cartridges, coats of arms, &c.

They first dig a hole, of a sufficient depth to contain the mould of the bell, together with the case, or cannon, under-ground ; and about six inches lower than the terreplain, where the work is performed. The hole must be wide enough for a free passage between the mould and walls of the hole ; or between one mould and another, when several bells are to be cast. At the center of the hole is a stake erected, that is strongly fastened in the ground. This supports an iron-peg, on which the pivot of the second branch of the compasses turns. The stake is encompassed with a solid brick-work, perfectly round, about half a foot high, and of the proposed bell's diameter. This they call a mill-stone. The parts of the mould are the core, the model of the bell, and the shell. When the outer surface of the core is formed, they begin to raise the core, which is made of bricks that are laid in courses of equal height upon a lay of plain earth. At the laying each brick, they bring near it the branch of the compasses, on which the curve of the core is shaped, so as that there may remain between it and the curve the distance of a line, to be afterwards filled up with layers of cement. The work is continued to the top, only leaving an

opening for the coals to bake the core. This work is covered with a layer of cement, made of earth and horfe-dung, on which they move the compasses of construction, to make it of an even smoothness every where.

The first layer being finished, they put the fire to the core, by filling it half with coals, through an opening that is kept shut, during the baking, with a cake of earth, that has been separately baked. The first fire consumes the stake, and the fire is left in the core half, or, sometimes, a whole day : the first layer being thoroughly dry, they cover it with a second, third, and fourth ; each being smoothed by the board of the compasses, and thoroughly dried before they proceed to another.

The core being completed, they take the compasses to pieces, with intent to cut off the thickness of the model, and the compasses are immediately put in their place, to begin a second piece of the mould. It consists of a mixture of earth and hair, applied with the hand on the core, in several cakes that close together. This work is finished by several layers of a thinner cement of the same matter, smoothed by the compasses, and thoroughly dried, before another is laid on. The first layer of the model is a mixture of wax and grease spread over the whole. After which are applied the inscriptions, coats of arms, &c. besmeared with a pencil dipped in a vessel of wax in a chaffing-dish : this is done for every letter. Before the shell is begun, the compasses are taken to pieces, to cut off all the wood that fills the place of the thickness to be given to the shell.

The first layer is the same earth with the rest, sifted very fine ; whilst it is tempering in water, it is mixed with cow's hair, to make it cohere. The whole being a thin cullis, is gently poured on the model, that fills exactly all the sinuosities of the figures, &c. and this is repeated till the whole is two lines thick over the model. When this layer is thoroughly dried, they cover it with a second of the same matter, but something thicker : when this second layer becomes of some consistence, they apply the compasses again, and light a fire in the core, so as to melt off the wax of the inscriptions, &c.

After this, they go on with other layers of the shell, by means of the compasses. Here they add to the cow's hair a quantity of hemp, spread upon the layers, and afterwards

afterwards smoothed by the board of the compasses. The thickness of the shell comes to four or five inches lower than the mill-stone before observed, and surrounds it quite close, which prevents the extravasation of the metal. The wax should be taken out before the melting of the metal.

The ear of the bell requires a separate work, which is done during the drying of the several incrustations of the cement. It has seven rings, the seventh is called the bridge, and unites the others, being a perpendicular support to strengthen the curves. It has an aperture at the top, to admit a large iron-peg, bent at the bottom; and this is introduced into two holes in the beam, fastened with two strong iron-keys. There are models made of the rings, with masses of beaten earth, that are dried in the fire, in order to have the hollow of them. These rings are gently pressed upon a layer of earth and cow's hair, one half of its depth; and then taken out, without breaking the mould. This operation is repeated twelve times for twelve half-moulds, that two and two united may make the hollows of the six rings: the same they do for the hollow of the bridge, and bake them all, to unite them together.

Upon the open place left for the coals to be put in, are placed the rings that constitute the ear. They first put into this open place the iron-ring to support the clapper of the bell; then they make a round cake of clay, to fill up the diameter of the thickness of the core. This cake, after baking, is clapped upon the opening, and foldered with a thin mortar spread over it, which binds the cover close to the core.

The hollow of the model is filled with an earth, sufficiently moist, to fix on the place, which is strewed, at several times, upon the cover of the core; and they beat it gently with a peltle, to a proper height; and a workman smooths the earth at top with a wooden trowel dipped in water.

Upon this cover, to be taken off afterwards, they assemble the hollows of the rings. When every thing is in its proper place, they strengthen the outsidings of the hollows with mortar, in order to bind them with the bridge, and keep them steady at the bottom, by means of a cake of the same mortar, which fills up the whole aperture of the shell. This they let dry, that it may be removed without

breaking. To make room for the metal they pull off the hollows of the rings, through which the metal is to pass, before it enters into the vacuity of the mould. The shell being unloaded of its ear, they range under the mill-stone five or six pieces of wood, about two feet long, and thick enough to reach almost the lower part of the shell; between these and the mould they drive in wooden wedges with a mallet, to shake the shell of the model whereon it rests, so as to be pulled up, and got out of the pit.

When this and the wax are removed, they break the model and the layer of earth, through which the metal must run, from the hollow of the rings, between the shell and the core. They smoke the inside of the shell, by burning straw under it, that helps to smooth the surface of the bell. Then they put the shell in the place, so as to leave the same interval between that and the core; and before the hollows of the rings or the cap are put on again, they add two vents, that are united to the rings, and to each other, by a mass of baked cement. After which they put on this mass of the cap, the rings, and the vent, over the shell, and folder it with thin cement, which is dried gradually by covering it with burning coals. Then they fill up the pit with earth, beating it strongly all the time, round the mould.

The furnace has a place for the fire, and another for the metal. The fire-place has a large chimney with a spacious ash-hole. The furnace which contains the metal, is vaulted, whose bottom is made of earth, rammed down; the rest is built with brick. It has four apertures; the first, through which the flame reverberates; the second is closed with a stopple that is opened for the metal to run; the others are to separate the dross, or scoriæ, of the metal by wooden rakes: through these last apertures passes the thick smoke. The ground of the furnace is built sloping, for the metal to run down.

#### FOUNDRY of great guns and mortar-pieces.

The method of casting these pieces is little different from that of bells: they are run maffy, without any core, being determined by the hollow of the shell; and they are afterwards bored with a steel trepan, that is worked either by horses, or a water-mill.

For the metal, parts, proportions, &c. of these pieces. See CANNON.

*Letter FOUNDRY, or Casting of printing letters.* The first thing requisite is to prepare good steel-punches, on the face of which is drawn the exact shape of the letter with pen and ink, if the letter be large, or with a smooth blunted point of a needle, if small; and then, with proper gravers, the cutter digs deep between the strokes, letting the marks stand on the punch; the work of hollowing being generally regulated by the depth of the counter-punch: then he files the outside, till it is fit for the matrice.

They have a mould to justify the matrices by, which consists of an upper and under part, both which are alike, except the stool and spring behind, and a small roundish wire in the upper part, for making the nick in the flank of the letter. These two parts are exactly fitted into each other, being a male and female gage,\* to slide backwards and forwards. See the article GAGE.

Then they justify the mould, by casting about twenty samples of letters, which are set in a composing-stick, with the nicks towards the right hand; and comparing these every way with the pattern-letters, set up in the same manner, they find the exact measure of the body to be cast.

Next they prepare the matrix, which is of brass or copper, an inch and a half long, and of a proportionable thickness to the size of the letter it is to contain. In this metal is sunk the face of the letter, by striking the letter-punch the depth of an *n*. After this, the sides and face of the matrice are justified, and cleared, with files, of all bunchings that have been made by sinking the punch.

Then it is brought to the furnace, which is built upright of brick with four square sides, and a stone at top, in which is a hole for the pan to stand in. They have several of these furnaces. See the article FURNACE.

Printing-letters are made of lead, hardened with iron or stub-nails. To make the iron run, they mingle an equal weight of antimony, beaten small in an iron mortar, and stub-nails together. They charge a proper number of earthen pots, that bear the fire, with the two ingredients, as full as they can hold, and melt it in an open furnace, built for that purpose. See the article FLUX.

When it bubbles, the iron is then melted, but it evaporates very much. This melted compott is ladled into an iron-pot,

wherein is melted lead, that is fixed on a furnace close to the former, 3 lb of melted iron to 2 1/2 lb of lead; this they incorporate according to art.

The caster taking the pan off the stone, and having kindled a good fire, he sets the pan in again, and metal in it to melt. If it be a small-bodied letter, or a thin letter with great bodies, that he intends to cast, his metal must be very hot, and sometimes red hot, to make the letter come. Then taking a ladle, of which he has several sorts, that will hold as much as will make the letter and break, he lays it at the hole where the flame bursts out; then he ties a thin leather, cut with its narrow end against the face, to the leather groove of the matrice, by whipping a brown thread twice about the leather groove, and fastening the thread with a knot. Then he puts both pieces of the mould together, and the matrice into the matrice-cheek; and places the foot of the matrice on the stool of the mould, and the broad end of the leather on the wood of the upper half of the mould, but not tight up, lest it hinder the foot of the matrice from sinking close down upon the stool, in a train of work. Afterwards laying a little rosin on the upper part of the mould, and having his casting-ladle hot, he, with the boiling side, melts the rosin and presses the broad end of the leather hard down on the wood and so fastens it thereto. Now he comes to casting, when placing the under half of the mould in his left hand, with the hook or jag forward, he holds the ends of its wood between the lower part of the ball of his thumb and his three hinder fingers; then he lays the upper half of the mould upon the under half, so as the male gages may fall into the female; and, at the same time, the foot of the matrice places itself upon the stool, and clasping his left hand thumb strongly over the upper half, he nimbly catches hold of the bow or spring, with his right hand fingers at the top of it, and his thumb under it, and places the point of it against the middle of the notch in the backside of the matrice, pressing it forwards as well towards the mould, as downwards, by the shoulder of the notch, close upon the stool, while at the same time with his hinder fingers, as aforesaid, he draws the under half of the mould towards the ball of his thumb, and thrusts, by the ball of his thumb, the upper part towards his fingers, that both the registers of the mould



mould may press against both sides of the matrice, and his thumb and fingers press both sides of the mould close together.

Then he takes the handle of his ladle in his right hand, and with the ball of it gives two or three strokes outwards upon the surface of the melted metal, to clear it of the scum; then he takes up the ladle full, and having the mould in the left hand, turns his left side a little from the furnace, and brings the geat of his ladle to the mouth of the mould; and turns the upper part of his right hand towards him, to pour the metal into it, while, at the same instant, he puts the mould in his left hand forwards, to receive the metal with a strong shake, not only into the bodies of the mould, but, while the metal is yet hot, into the very face of the matrice, to receive its perfect form there as well as in the shank. Then he takes the upper half of the mould off, by placing his right thumb on the end of the wood next his left thumb, and his two middle fingers at the other end of the wood: he tosses the letter, break and all, out upon a sheet of waste paper, laid on a bench, a little beyond his left hand; and then is ready to cast another letter, as before, and likewise the whole number in that matrix.

Then boys, commonly employed for this purpose, separate the breaks from the shanks, and rub them on a stone, and afterwards a man cuts them all of an even height, which finishes the fount for the use of the printer. See the next article.

A workman will ordinarily cast 3000 of these letters in a day. The perfection of letters thus cast, consists in their being all severally square and straight on every side; and all generally of the same height, and evenly lined, without stooping one way or other; neither too big in the foot, nor the head; well grooved, so as the two extremes of the foot contain half the body of the letter; and well ground, barbed, and scraped, with a sensible notch, &c. See the article PRINTING.

**FOUNT**, or **FONT**, among printers, a set or quantity of letters, and all the appendages belonging thereto, as numeral characters, quadrates, points, &c. cast by a letter-founder, and sorted. Founts are large or small, according to the demand of the printer, who orders them by the hundred weight, or by sheets. When a printer orders a fount of five hundred, he means that the fount, consisting of letters, points, spaces, qua-

drates, &c. shall weigh 500 lb. When he demands a fount of ten sheets, it is understood, that with that fount he shall be able to compose ten sheets, or twenty forms, without being obliged to distribute. The founder takes his measures accordingly; he reckons 120 lb. for a sheet, including the quadrates, &c. or 60 lb. for a form, which is only half a sheet: not that the sheet always weighs 120 lb. or the form 60 lb. on the contrary, it varies according to the size of the form; besides, it is always supposed that there are letters left in the cases. As therefore every sheet does not comprehend the same number of letters, nor the same sort of letters, we must observe, that, as in every language some sounds recur more frequently than others, some letters will be in much more use, and oftener repeated than others, and consequently their cells or cases should be better stored than those of the letters which do not recur so frequently: thus, a fount does not contain an equal number of *a* and *b*, or of *b* and *c*, &c. the letter-founders have therefore a list or tariff, or, as the French call it, a *police*, by which they regulate the proportions between the different sorts of characters that compose a fount; and it is evident that this tariff will vary in different languages, but will remain the same for all sorts of characters employed in the same language.

**FOUNTAIN**, *fons*, in philosophy, a spring or source of water rising out of the earth. Among the antients, fountains were held sacred, and even worshipped as a kind of divinities. For the phenomena, theory, and origin of fountains or springs, see the article SPRING.

**FOUNTAIN**, or *Artificial FOUNTAIN*, in hydraulics, called also a *jet d'eau*, is a contrivance by which water is violently spouted upwards.

The theory of fountains, in regard to the action of the several parts of a fluid upon each other, depends on the following principles. It has been shewn, under the article FLUID, that water coming from a reservoir, as ABCD (pl. CV. n° 1.) through the pipe EFGH, will rise from the lowest part, G, to the same altitude H, in the part GH, as is upon a level with the surface of the water AB, in the reservoir: and also, that it thus rose from the point G, by a force of pressure proportional to the altitude of the water in the reservoir, which is equal to the altitude GH. Now it is very evident that

the tube GH itself can contribute nothing towards the waters rising in it; on the contrary it rather impedes the ascent, by the friction it occasions to the particles which move against the internal surface thereof. Therefore, if the part GH be taken away, the water would rise to the same height H, excepting so far as it is obstructed by other concurring incidents; for in all fountains the height GI is somewhat less than GH, the height of the tube, for the following reasons: 1. The air's resistance is an obstruction to the jet, and diminishes its height; and since we know that the resistance of fluids is proportional to the squares of the velocity, and the deficiency of the height HI is proportional to the resistance; therefore a jet that plays with a double velocity, will have that deficiency four times as great; and with three times the velocity, nine times as great, and so on. 2. The second impediment is the friction against the sides of the hole, and the adjutage at G; and since this is in proportion to the quantity of surface in the hole, it will be greater in a small hole than in a great one, in respect to the body of the spouting water; because the jet will increase in magnitude with the square of the diameter of the hole, whereas the resistance will increase only with the diameter simply: or, a hole of twice the diameter emits four times the water, and gives but twice the resistance: this makes a small jet rise to less height than a large one from the same fountain. 3. A third impediment arises from hence, that since all the particles set out from G, with an equal velocity, and this velocity is continually diminishing, it follows, that the velocity of the inferior parts is greater than the velocity of the parts above them, and therefore must in some degree strike against them: by which impulse, since fluids move every way, the particles will be urged side-ways, and the column of the jet become wider, and consequently shorter than it would otherwise be. 4. The fourth cause why jets do not rise to the height of the reservoirs, is because the water upon the top of the jet does not immediately run off, but spreading into a head, lies with its weight upon the ascending water below, and hinders it from rising so high as it would otherwise do: this will appear by inclining the jet a little, that the upper water may not bear upon the rising stream; for the jet will then play higher, but be less beautiful.

If the hole of the adjutage G be less than a quarter of an inch in diameter, the force of the attraction of cohesion will extend itself through the body of the jet at the hole, and greatly obstruct its ascent: whence all jets of larger fountains, such as are in gentlemen's gardens, ought to exceed a quarter of an inch in diameter, and that in proportion to the height of the reservoir.

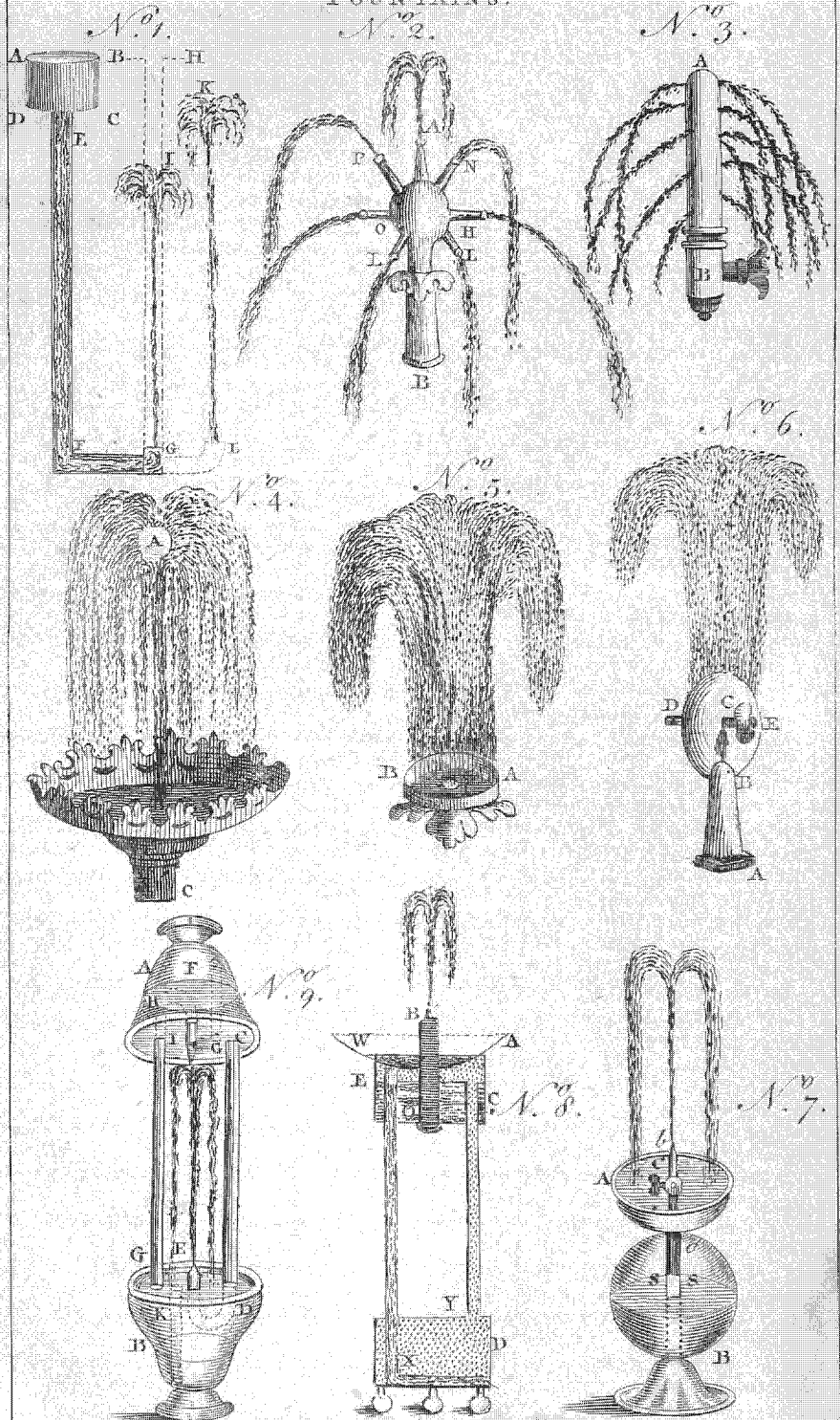
And one thing more is necessary to be known, that the jet may play the highest possible, *viz.* that the part of the conduct pipe at the adjutage, does not turn up at right angles, but with a gentle easy curve; that is, not as at C, but as at L, where the jet plays to a greater height at K: the upright part at G directly resists the water coming from F, whereas the curve at L causes the impulse of the water against it to be oblique; and therefore a less part of its momentum will be destroyed, and consequently the greater remaining force will throw the jet the higher.

A Table of the height to which jets will rise, in feet and decimal parts, from reservoirs of an height of five feet to an hundred and fifty feet.

Rei.	Jet.	Rei.	Jet.	Rei.	Jet.	Rei.	Jet.
5	4,91	31	28,32	57	48,99	83	67,71
6	5,88	32	29,16	58	49,74	84	68,40
7	6,84	33	30,00	59	50,49	85	69,08
8	7,80	34	30,83	60	51,24	86	69,76
9	8,74	35	31,63	61	51,99	87	70,47
10	9,68	36	32,47	62	52,73	88	71,14
11	10,62	37	33,29	63	53,47	89	71,81
12	11,55	38	34,11	64	54,20	90	72,48
13	12,48	39	34,93	65	54,93	91	73,15
14	13,40	40	35,74	66	55,66	92	73,82
15	14,31	41	36,55	67	56,39	93	74,49
16	15,22	42	37,35	68	57,12	94	75,16
17	16,13	43	38,14	69	57,84	95	75,83
18	17,03	44	38,93	70	58,56	96	76,49
19	17,93	45	39,75	71	59,28	97	77,15
20	18,82	46	40,53	72	60,00	98	77,81
21	19,70	47	41,31	73	60,71	99	78,47
22	20,58	48	42,09	74	61,42	100	79,12
23	21,46	49	42,87	75	62,13	110	85,58
24	22,33	50	43,65	76	62,84	120	91,86
25	23,20	51	44,42	77	63,54	130	97,99
26	24,06	52	45,19	78	64,24	140	103,97
27	24,92	53	45,96	79	64,94	150	107,87
28	25,78	54	46,72	80	65,64		
29	26,63	55	47,48	81	66,33		
30	27,48	56	48,24	82	67,02		



FOUNTAINS.



From what has been said upon the second cause assigned for the obstruction the jet meets with in rising to the height of the reservoir, which is the friction against the sides of the hole and the adjutage, it appears, *ceteris paribus*; that the hole in the adjutage ought to be made in a thin plate of brass, and not through the bore of a tube of any length, because of the quantity of surface in such an adjutage-piece which must greatly retard the jet, and diminish the height.

If the conduit-pipe EFG be not of a proper size to supply water as fast as it can be expended at the adjutage G, the jet will likewise be checked, and it will not rise to the full height. To ascertain the proportion of the conduit-pipe to the bore of the adjutage, is shewn by the following table, made by Mr. Mariotte, Dr. Desaguliers, and others, who, by various experiments, found that if the reservoir be 5 feet high, a conduit-pipe  $1\frac{3}{4}$  inch diameter will admit a hole in the adjutage from  $\frac{1}{4}$  of an inch to  $\frac{3}{4}$  of an inch; and so on, as in the following table.

Height of the reservoir.	Diameter of the ad- jutages.		Diameter of the pipes of conduit.	
	Feet.	Inch.	Inch.	
5		$\frac{1}{4}$ to $\frac{3}{8}$	$1\frac{3}{4}$	
10		$\frac{1}{4}$ to $\frac{1}{2}$	2	
15		$\frac{1}{4}$ to $\frac{1}{2}$	$2\frac{1}{4}$	
20		$\frac{1}{4}$ to $\frac{1}{2}$	$2\frac{1}{2}$	
25		$\frac{1}{4}$ to $\frac{1}{2}$	$2\frac{3}{4}$	
30		$\frac{1}{4}$ to $\frac{3}{4}$	3 or $3\frac{1}{2}$	
40		$\frac{3}{8}$ to $\frac{1}{2}$	$4\frac{1}{4}$	
50		$\frac{3}{8}$ to $\frac{1}{2}$	5	
60		1	$5\frac{3}{4}$	
80		$1\frac{1}{4}$ to $1\frac{1}{2}$	$6\frac{1}{2}$	
100		$1\frac{1}{4}$ or $1\frac{1}{2}$	7 or 8	

Here the jet is supposed to be within 100 or 150 yards of the reservoir; but if the conduit-pipe much exceeds this length, it must be of a larger diameter than what is here assigned: thus, for jets from  $\frac{3}{4}$  of an inch, to those of an inch, and from reservoirs from 40 to 90 feet height, if the distance be from 150 yards to  $\frac{1}{4}$  of a mile, the diameter of the pipe should be of 6 inches; from  $\frac{1}{4}$  of a mile to  $\frac{1}{2}$  miles it must be of 7 inches; and from  $\frac{1}{2}$  miles to 5, it must be 8 inches diameter for the same jets. If it be required to keep any number of jets playing, whose ad-

jutages are given in diameter by one common conduit-pipe, we must find the diameter of an adjutage equal to all the given ones: thus, if there be four adjutages of  $\frac{3}{4}$  of an inch each, then the square of  $\frac{3}{4}$  is  $\frac{9}{16}$ , which multiplied by the number of adjutages 4, makes  $\frac{36}{16}$ , the square root of which is  $\frac{6}{2} = 3$  — the diameter of the adjutage, equal to all the four small ones. A pipe of conduit of 10 inches diameter will supply all the jets, as being a little more than six times as great as the diameter of the one large adjutage now found. After this manner the dimensions of a conduit-pipe may be found for any number of adjutages.

A fountain that shall spout the water in various directions is made as follows: suppose the vertical tube in which the water rises, to be AB (*ibid.* n° 2.) in this fit several other tubes, some horizontal, others oblique, some inclining, others reclining, L, O, P, A, N, &c. then as all water retains the direction of the aperture through which it is spouted, that issuing through A will rise perpendicularly, and that through L, H, N, P, O, will describe arches of different magnitudes, tending different ways.

Or thus: suppose the vertical tube AB (*ibid.* n° 3.) to be stopped at top, as at A; and instead of pipes, or jets, let it be only perforated with little holes all round, or only half its surface; then will the water spout forth in all directions through the little apertures, to a distance proportional to the height of the fall of the water.

A ball, A, if its weight be not too heavy, being laid in the bottom of the cup or basin B (*ibid.* n° 4.) will be taken up in the stream, and sustained at a considerable height, as A; alternately vibrating, or playing up and down, provided the tube BC, through which the water rises, be exactly perpendicular to the horizon.

The ball may be made of a thin plate of brass, or any other light metal; but as its figure of a ball contributes nothing to its reciprocal rise and fall, any other body, not too heavy, may be substituted in place thereof. As it is necessary that the body sustained by the jet, should keep the same precise perpendicular on its descent and rise, since otherwise it would miss the stream, such a fountain should be played in a place free from wind.

A fountain may be made to spout water in manner of a shower, by fitting a spherical

rical or lenticular head AB (*ib. n° 5.*) made of a plate of métal, and perforated at top with a great number of little holes; for the water, rising with a certain velocity towards AB, will there be divided in innumerable little threads, and afterwards be broke and dispersed into small drops.

A fountain may be made to spread the water in form of a cloth, by folding two spherical segments C and D (*ibid. n° 6.*) so close together as to be almost touching one another, with a screw E, to contract or amplify the interstice, or chink, at pleasure: then this spherical head being fitted upon the tube, the water spouting through the chink, will expand itself in manner of a cloth.

The theory of fountains, with regard to the action of air upon water by condensation and rarefaction, may be sufficiently understood from what has been delivered under the articles FLUID, AIR, ENGINE, CONDENSATION, RAREFACTION, and ELASTICITY; whence it appears, that condensed air injected into any vessel containing water, will, by means of its elasticity, cause the water to spout out thro' an adjutage to an height proportionable to the spring of the condensed air. Upon this principle the following fountain AB (*ibid. n° 7.*) depends, where the air is condensed at the top of the water by a syringe, and the air and water retained by the cock at C, so that the fountain cannot play till you open the cock; then the water strongly pressed by the condensed air at SS, goes through the pipe *a*, and the adjutage *b*, with great force, in jets of several figures, according to the spouting-pipes, put on at *b*.

As here the air is compressed by a syringe, in the fountain (*ibid. n° 8.*) the air being only compressed by the concealed fall of water, makes a jet, which, seen for a while, is looked on as a perpetual motion by the ignorant, who think that the same water that fell from the jet, rises again.

The boxes CE, and D Y X, being close, you see only the basin ABW, with a hole at W, into which the water, spouting out at B, falls; but that water going down the hole W, does not come up again at W, but runs down through the pipe WX, into the box D Y X, from whence it drives out the air thro' the ascending pipe YZ, into the cavity of the box CE, where, pressing upon the water that is in it, it forces it out through the

spouting-pipe OB, as long as there is any water in CE; so that this whole play is only while the water contained in CE, having spouted out, falls down through the pipe WX, into the cavity D Y X. The force of the jet is proportionable to the height of the pipe WX, or of the boxes CE and DY, above one another. The height of the water measured from the basin ABW, to the surface of the water in the lower box D Y X is always equal to the height measured from the top of the jet to the surface of the water in the middle cavity at CE. Now since the surface CE is always falling, and the water DY is always rising, the height of the jet must continually decrease, till it is shorter by the height of the depth of the cavity CE, which is emptying, added to the depth of the cavity D Y, which is always filling, and when the jet is fallen so low, it immediately gives over.

The way to prepare this fountain for playing, is as follows: first, pour in water at W, till you have filled the cavity D Y X; then turn the fountain over, and the water will run from the cavity D Y X into the cavity CE, which you will know to be full when the water runs out at B, held down; set the fountain up again, and pour in about a pint of water into the basin ABW, and so soon as it has filled the pipe WX, the fountain will play, and continue so long as there is any water in CE. You may then pour back the water left in the basin ABW, into any vessel, and invert the fountain; which being set upright again, will be set a playing by putting back the water poured out into ABW.

A fountain, which, when it has done spouting, may be turned up like an hour-glass, is made as follows: provide two vessels, AFH and BDG (*ib. n° 9.*) of a capacity proportionable to the time the fountain is required to play without turning up, and placed at so much the greater distance from each other as the water is required to spout the higher: the water contained in the cavity AFH, runs down the curve-pipe CDE, and spouts up through the jet E, by the pressure of the column of water CD; but unless the pipe GF, was open at G, to let the air run up to F, and press at the top of the surface of the water in the cavity A, the water would not run down and spout out at E: there is such another pipe as G K, belonging to the cavity B, through which



Fig. 1. FOUNTAINS.

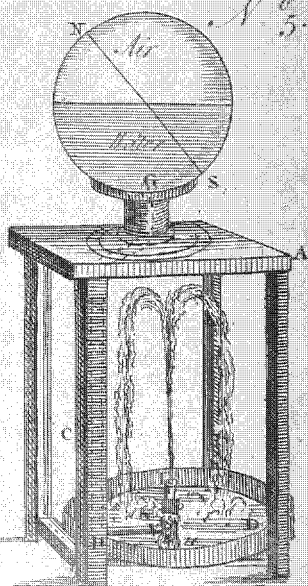
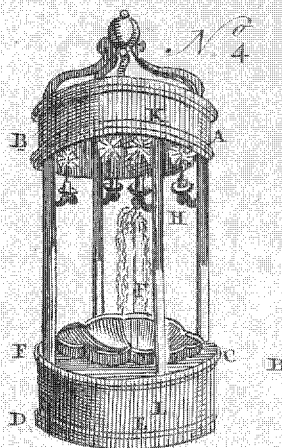
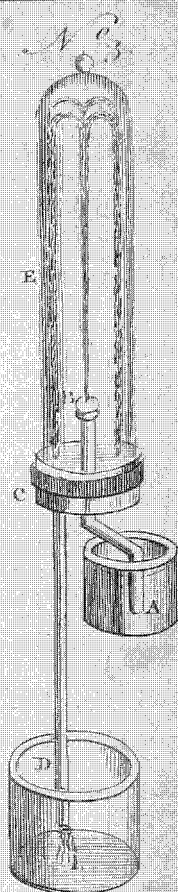
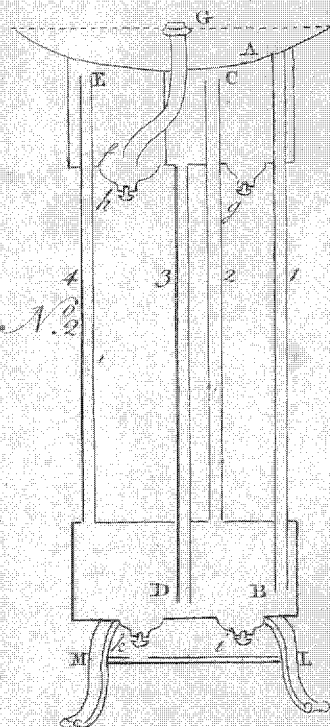
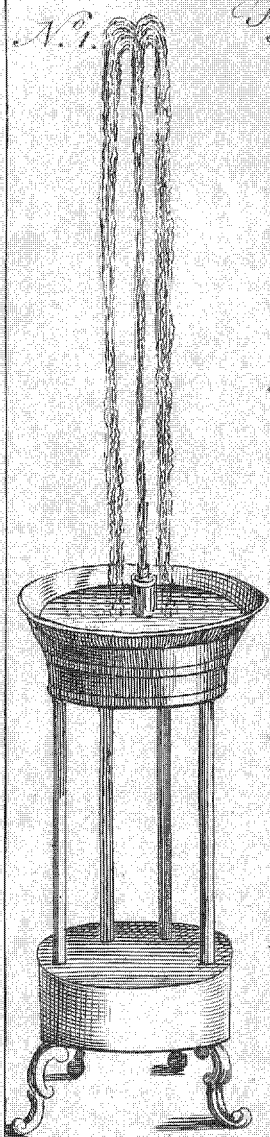
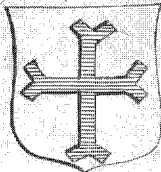
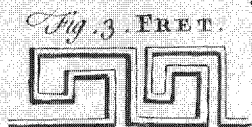


Fig. 2. FOURCHEE.





which the water of the jet is received into the basin, supplies the cavity B, whilst the fountain stands on the end B; but when the fountain is inverted, it supplies B with air, to let the water descend in the direction GHI, I becoming the spouting-pipe. Wherefore, by turning the machine upside down, the water spouts up through the cock at G, and the vessel AHC, will be the reservoir. Hence, if the vessels AFH and DKB contain just as much water as will be spouted up in an hour's time, we shall have a spouting clepsydra, which may be graduated or divided into quarters, minutes, &c. See the article CLEPSYDRA.

The fountain (plate CVI. n° 1.) is upon the same principle, and of the same kind with n° 8. plate CV. but having double the number of pipes and concealed cavities, it plays as high again. N° 2. must be examined, to see its cavities and pipes, where the basin is A, and the four cavities B, C, D, and E, from which the water from the pipe fG, spouts out to double the height of the fountain; the air at E, which drives it, being doubly condensed. The water going down the pipe i (suppose it three feet long) condenses the air that goes up into the cavity C, through the pipe 2, so as to make it  $\frac{1}{10}$  stronger than the common air; then the water which falling in the pipe 3, from C to D, is capable by the height of its fall, to condense the air at E, so as to make it  $\frac{1}{10}$  stronger, being pushed at C by air already condensed into  $\frac{1}{10}$  less space, causes the air at E to be condensed twice as much; that is, to be  $\frac{1}{5}$  stronger than the common air, so that it will make the water at G spout out with twice the force, and go to twice the height that it would do, if the fountain had been of the make of n° 8. pl. CV. The way to prepare this fountain for playing, is to turn it upside down, and taking out the plugs g, b, to fill the two cavities C and E, and having shut the holes again, set the fountain upright, and pour some water into the basin A, and the jet will play out at G.

Another way of making artificial fountains, is by the rarefaction of the air, in the manner following: AB and CD (*ibid.* n° 3.) are two pipes fixed to a brass-head C, to screw into a glass-vessel E, which having a little water in it, is inverted, till the pipes are screwed on;

then reverting it suddenly, so as to put A the lower end of the spouting-pipe AB, into a jar of water A; and the lower end of the descending pipe CD, into a receiving vessel D, the water will spout up from the jar A, into the tall glass vessel E, from which it will go down at the orifice C, through the descending pipe CD, into the vessel D, till the water is out of A (making a fountain in E) and has emptied itself into D.

The reason of the play in this fountain is this: the pipe CD being 2 feet 9 inches long, lets down a column of water which rarifies the air  $\frac{1}{12}$  part in the vessel E, where it presses against the water spouting at B, with  $\frac{1}{12}$  less force than the water is pushed up the hole A, by the pressure of the common air on the water in the vessel A; so that the water spouts up into E (when the air is rarified  $\frac{1}{12}$ ) with the difference of the pressure of the atmosphere, and the aforesaid rarified air; that is, of 33 to 2  $\frac{3}{4}$ . This would raise the water 2. feet 9 inches: but the length of the pipe A, 9 inches, being deducted, the jet will only rise 2 feet. This may be called a syphon-fountain, where AB is the driving leg, and CD the issuing leg.

A fountain that begins to play upon the lighting of candles, and ceases when they go out, may be contrived as follows: provide two cylindrical vessels AB and CD (*ibid.* n° 4.) connect them by tubes open at both ends KL, FB, &c. so that the air may descend out of the higher into the lower; to these tubes solder candlesticks, H, &c. and to the hollow cover of the lower vessel CF, fit a little tube or jet FE, furnished with a cock G, and reaching almost to the bottom of the vessel. In G let there be an aperture furnished with a screw, whereby water may be poured into CD. Then upon lighting the candles H, &c. the air in the contiguous tubes becoming rarefied thereby, the water will begin to spout through EF.

There are many other artificial fountains made upon these principles; but what are explained may be sufficient, when we have added to it the description of one invented by Dr. Desaguliers to play by the spring of the air, increased by the heat of the sun, which also serves for a dial at the same time.

GNS (*ibid.* n° 5.) is a hollow globe of thin copper, of 18 inches in diameter, supported

supported by a small inverted bason, standing on a frame with four legs A, B, C, &c. which have between them, at the bottom, a large bason of two feet diameter. Along the leg C comes a concealed pipe, going from G, the bottom of the inside of the globe, which pipe comes along HV to join in an upright pipe uI, to make a jet at I. The short pipe Iu going to the bottom of the bason, has a valve at V, under the horizontal part H u, and another valve at V, above the said horizontal pipe, under the cock at K. The north pole N, has a screw to open an hole, whereby to fill the globe with matter. Things thus prepared, and the globe half filled with water, let the machine be set in a garden; and the heat of the sun rarefying the air, as it heats the copper, the air will press hard upon the water, which coming down the pipe GCHVI, will lift up the valve V, but shut the valve u; and the cock being open, spout out at I, and continue to do so for a long time, if the sun shines. At night, as the air condenses again, the outward air pressing the adjutage I, will shut the valve V, but pressing on the bason D u H, it will push up the water, which has been played in the day time through the valve u, and pipe uHG into the globe, so as to fill it up again to the same height that the water was at first, and the next sun-shine will cause the fountain to play again, &c. The use of the cock is to keep the fountain from playing till the time of day that you think proper. A small jet will play six or eight hours. If the globe be set for the latitude of the place, and rectified before it be fixed, with the hour lines or meridians drawn upon it, the hours marked and the countries painted as in the common globe, it will be a good dial; the sun shining upon the same places in this globe, as it does upon the earth itself.

**FOUR-CORNERS**, in the manege. To work upon the four-corners, is to divide (in imagination) the volt, or round, into four quarters: when a horse has made a round or two, either at trot or gallop, he is said to have made the four-corners.

**FOURCHEE**, or **FOURCHY**, in heraldry, an appellation given to a cross forked at the ends. See plate CVI. n° 6.

**FOURCHER**, or **FOURCHING**, in law, signifies the delaying or putting off an action, which might have been brought to a determination in a shorter time.

**FOURCHETTE**, or **FER DE FOUCHETTE**.

See the article **FER**.

**FOURTH**, in music, one of the harmonical intervals, called concords. See the articles **CONCORD** and **INTERVAL**.

It is called fourth, as containing four sounds or terms between its extremes, and three intervals; or as being the fourth in order of the natural or diatonic scale, from the fundamental. The antients called it diatessaron, and speak of it as the principal concord, on whose divisions all the rest depend; but the moderns, so far from allowing it such perfections, find it one of the most imperfect, and even dispute whether it ought to be received among the number of concords at all.

It consists in the mixture of two sounds, in the ratio of 4 : 3; that is, of two sounds produced by two cords, whose lengths, &c. are in that proportion.

*Diminished* **FOURTH**. See **DIMINISHED**.

*Superfluous* **FOURTH**, a discord consisting of two tones major and one minor, called also tritone: it is composed of the ratios 27 : 20, and 4 : 5. See **DISCORD**.

**FOURTH-RATE**. See the article **RATE**.

**FOWEY**, a borough-town of Cornwall, which sends two members to parliament: west long. 5°, and north lat. 50° 26'.

**FOWL**, among zoologists, denotes the larger sorts of birds, whether domestic or wild: such are geese, pheasants, partridges, turkey, ducks, &c. See the articles **GEESE**, **PHEASANT**, &c.

Tame fowl make a necessary part of the stock of a country farm. See the article **POULTRY**.

Fowls are again distinguished into two kinds, *viz.* land and water-fowl; these last being so called, from their living much in and about water: also into those which are accounted game, and those which are not. See the article **GAME**.

**FOWLING**, the art of catching birds by means of nets, bird-lime, decoys, and other devices. See the articles **NET**, **BIRD-LIME**, &c.

**FOWLING** is also used for the pursuing and taking birds with hawks, more properly called falconry. See **FALCONRY**.

**FOWLING-PIECE**, a light gun for shooting birds. That piece is always reckoned best which has the longest barrel, from 5½ to 6 feet, with a moderate bore; tho' every fowler should have them of different sizes, suitable to the game he designs to kill. The barrel should be well polished and smooth within, and the bore of an equal bigness from one end to the other;

other; which may be proved, by putting in a piece of pasteboard, cut of the exact roundness of the top: for if this goes down without stops or slipping, you may conclude the bore good. The bridge-pan must be somewhat above the touch-hole, and ought to have a notch to let down a little powder: this will prevent the piece from recoiling, which it would otherwise be apt to do. As to the locks, choose such as are well filed with true work, whose springs must be neither too strong nor too weak. The hammer ought to be well hardened, and pliable to go down to the pan with a quick motion.

In shooting, observe to do it, if possible, with the wind, not against it; and rather sideways, or behind the fowl, than full in their faces. Observe also to choose the most convenient shelter you can find, as a hedge, bank, tree, or the like. Take care to have your dogs under good command, that they may not dare to stir till you give the word, after discharging your piece: for some ill-taught dogs will, upon only the snap of the cock, presently rush forward, and spoil your sport. If you have not shelter enough, you must creep upon your hands and knees, or even make use of a stalking-horse.

**FOX**, *vulpes*, in zoology, an animal of the dog-kind, which much resembles the common dog in form, and is of the size of a spaniel: it is chiefly distinguished by its long and straight tail, with the tip white. See the articles **CANIS** and **DOG**. The fox is a native of most northern countries. That of Siberia, is about the size of the common kind; but its head is larger, and its tail not only larger and more bushy, but all of one colour. See plate CVII. fig. 1.

A fox in the first year is called a cub; in the second, a fox; and afterwards an old fox. It is a beast of chase, usually very prejudicial to the husbandman, by taking away and destroying his lambs, geese, poultry, &c. The common way to catch him is by gins; which being bated, and a train made by drawing raw flesh across in his usual paths or haunts to the gin, it proves an inducement to bring him to the place of destruction. They are also taken with greyhounds, hounds, terriers, and nets. It is a commendable exercise to hunt these mischievous beasts, the nature of which in many respects is like that of wolves. See the article **HUNTING**.

**FOX-GLOVE**, *digitalis*, in botany. See the article **DIGITALIS**.

**FOY**, or **ST. FOY**, a town of Guienne, in France, thirty-two miles east of Bourdeaux; it is situated under the meridian of London, in  $44^{\circ} 50'$ , north lat.

**FOYLING OF LAND**, the same with following it. See the article **FOLLOWING**.

**FOYLING**, among sportsmen, denotes the footsteps of a stag on grass or leaves.

**FOYNA**, in zoology, a name sometimes given to the martin. See **MARTIN**.

**FRACHES**, in glass-making, flat iron-pans, wherein the new-made vessels are put, to be removed gradually from the fire. See the article **GLASS**.

**FRACTION**, in arithmetic and algebra, is a part or parts of something considered as an unite or integer.

Fractions are distinguished into vulgar or common, and sexagesimal and decimal. See the articles **SEXAGESIMAL** and **DECIMAL**.

Vulgar fractions, called also simply fractions, consist of two parts or quantities, one wrote over the other, with a line between them. The quantity placed above the line is called the numerator of the fraction; and the quantity placed under the line, the denominator. See the articles **NUMERATOR** and **DENOMINATOR**.

Thus,  $\frac{2}{3}$  expresses the quotient of 2 divided by 3; and 2 is the numerator, and 3 the denominator. If the numerator of a fraction is equal to its denominator, then the fraction is equal to unity: Thus

$\frac{4}{4} = 1$ , and  $\frac{a}{a}$  or  $\frac{b}{b}$  are likewise equal to

unity. If the numerator is greater than the denominator, then the fraction is greater than unit. In both these cases, the fraction is called improper. But if the numerator is less than the denominator, then the fraction is less than unit, and is called proper. Thus  $\frac{5}{3}$  is an improper fraction, but  $\frac{3}{4}$  or  $\frac{2}{3}$  are proper fractions. A mixt quantity is that whereof one part is an integer, and the other a fraction; as  $3\frac{2}{3}$ ,  $5\frac{2}{3}$ , and

$a + \frac{a^2}{b}$ . See the articles **CHARACTER**

and **NOTATION**.

**Problem I.** To reduce a mixt quantity to an improper fraction, multiply the part that is an integer by the denominator of the fractional part; and, to the product, add the numerator; then place the former denominator under this sum, and you will have the improper fraction required.

Thus,  $2\frac{3}{5}$ , reduced to an improper fraction, gives  $\frac{13}{5}$ ; for  $2 \times 5 = 10$ , and  $10 + 3 = 13$ , which, divided by the former denominator 5, gives  $\frac{13}{5}$ . In the same manner  $4\frac{1}{2}$ , gives  $\frac{9}{2}$ ; and  $a + \frac{a^2}{b}$ , gives  $\frac{ab + a^2}{b}$ ; and  $a - x + \frac{a^2 - ax}{x} = \frac{a^2 - x^2}{x}$ .

Problem II. To reduce an improper fraction to a mixt quantity, divide the numerator of the fraction by the denominator, and the quotient shall give the integral part; and the remainder, set over the denominator, shall be the fractional part. Thus,  $\frac{12}{5} = 2\frac{2}{5}$ ;  $\frac{ab + a^2}{b} =$

$$a + \frac{a^2}{b}; \frac{ax + 2xx}{a + x} = x + \frac{x^2}{a + x}; \text{ and } \frac{aa + xx}{a - x} = a + x + \frac{2xx}{a - x}.$$

Problem III. To reduce fractions of different denominations to fractions of equal value, that shall have the same denominator; multiply each numerator, taken separately, into all the denominators but its own, and the products shall give the new numerators: then multiply all the denominators into one another, and the product shall give the common denominator. Thus,  $\frac{2}{3}$ ,  $\frac{3}{4}$ , and  $\frac{4}{5}$  are respectively equal to  $\frac{40}{60}$ ,  $\frac{45}{60}$ , and  $\frac{48}{60}$ ; and  $\frac{a}{b}$ ,  $\frac{c}{d}$ , and  $\frac{e}{f}$  are respectively equal to  $\frac{acd}{bcd}$ ,  $\frac{bcd}{bcd}$ , and  $\frac{ccb}{bcd}$ .

Problem IV. To add and subtract fractions, first reduce them to a common denominator (by Probl. III.) then add or subtract the numerators, and the sum or difference set over the common denominator, will be the sum or difference required. Thus,  $\frac{2}{3} + \frac{1}{4} = \frac{8 + 3}{12} = \frac{11}{12}$ ; and  $\frac{3}{4} - \frac{2}{3} = \frac{9 - 8}{12} = \frac{1}{12}$ . In the same manner,  $\frac{a}{b} + \frac{c}{d} + \frac{e}{f} = \frac{adf + bdf + ebd}{bdf}$ ;

and  $\frac{a}{b} - \frac{c}{d} = \frac{ad - cb}{bd}$ ; and  $\frac{x}{2} - \frac{x}{3} = \frac{3x - 2x}{6} = \frac{x}{6}$ . See SUBTRACTION.

Problem V. To multiply fractions; let their numerators be multiplied into one another, to obtain a new numerator, and the denominators into one another, to

obtain a new denominator; and the numerator and denominator so found will be the product required.

Thus,  $\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$ ; and  $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$ .

In the same manner,  $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$ ; and

$$\frac{a + b}{c} \times \frac{a - b}{d} = \frac{a^2 - b^2}{cd}.$$

If a mixt quantity is to be multiplied, first reduce it to the form of a fraction (by Probl. I.) and if an integer is to be multiplied by a fraction, you may reduce it to the form of a fraction, by placing unit under it. Thus,  $5\frac{2}{3} \times \frac{4}{5} = \frac{17}{3} \times \frac{4}{5} = \frac{68}{15} = 4\frac{8}{15}$ , (by Probl. II.) Also  $9 \times \frac{2}{3} = \frac{9}{1} \times \frac{2}{3} = \frac{18}{3} = 6$ ; and, in the

same manner,  $b + \frac{bx}{a} \times \frac{a}{x} = \frac{ba + bx}{a} \times \frac{a}{x} = \frac{a^2b + abx}{ax} = \frac{ab(b + x)}{x}$ .

Problem VI. To divide fractions; first multiply the numerator of the dividend by the denominator of the divisor, and the product will be the numerator of the quotient; then multiply the denominator of the dividend by the numerator of the divisor, and their product will give the denominator of the quotient. Thus,

$$\frac{4}{5} \div \frac{2}{3} = \frac{4}{5} \times \frac{3}{2} = \frac{12}{10} = \frac{6}{5}; \text{ and } \frac{a + b}{a - b} \div \frac{a - b}{a} = \frac{(a + b)a}{(a - b)(a - b)} = \frac{a(a + b)}{a^2 - 2ab + b^2}.$$

These last four problems are easily demonstrated from the definition of a fraction. 1. It is obvious, that the fractions  $\frac{a}{b}$ ,  $\frac{c}{d}$ ,  $\frac{e}{f}$ , are respectively equal to  $\frac{adf}{bdf}$ ,  $\frac{cdf}{bdf}$ ,  $\frac{ebd}{bdf}$ ; since if you divide  $adf$  by  $bdf$ , the quotient will be  $\frac{a}{b}$ ;  $\frac{cdf}{bdf} = \frac{c}{d}$ ; and  $\frac{ebd}{bdf} = \frac{e}{f}$ .

2. Fractions reduced to the same denominator are added by adding their numerators and subscribing the common denominator.

Thus,  $\frac{a}{b} + \frac{c}{b} = \frac{a + c}{b}$ ; for call  $\frac{a}{b} = m$ , and  $\frac{c}{b} = n$ , and it will be  $a = mb$ , and  $c = nb$ ; and  $mb + nb = a + c$ , and  $m + n = \frac{a + c}{b}$ ; that is,  $\frac{a}{b} + \frac{c}{b}$ . After the same manner,  $\frac{a}{b} - \frac{c}{b} = m - n = \frac{a - c}{b}$ .

3. Again,  $\frac{a}{b} \times \frac{c}{d} (=m \times n) = \frac{ac}{bd}$ ; for  $bm = a$ ,  $dn = c$ ; and  $bdmn = ac$ , and  $mn = \frac{ac}{bd}$ ; that is,  $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$ . 4.

Lastly,  $\frac{a}{b} \div \frac{c}{d}$ , or  $\frac{m}{n}$ , gives  $\frac{ad}{cb}$ ; for  $mb = a$ , and  $mbd = ad$ ;  $nd = c$ , and  $ndb = cb$ : therefore  $\frac{mbd}{ndb} = \frac{ad}{cb}$ ; that is,  $\frac{m}{n} = \frac{ad}{cb}$ .

Problem VII. To find the greatest common measure of two numbers; that is, the greatest number that can divide them both without a remainder. First divide the greater number by the lesser, and if there is no remainder, the lesser number is the greatest common divisor required. If there is a remainder, divide your last divisor by that remainder; and thus proceed, continually dividing the last divisor by its remainder, till there is no remainder left; and then the last divisor is the greatest common measure required. Thus, the greatest common measure of 45 and 63 is 9; and the greatest common measure of 256 and 48, is 16, as appears from the operation at large.

$$\begin{array}{r}
 45 \overline{)63(1} \qquad 48 \overline{)256(5} \\
 \underline{45} \qquad \qquad \underline{240} \\
 18(45(2 \qquad \qquad 16(48(3 \\
 \underline{36} \qquad \qquad \underline{48} \\
 9(18(2 \qquad \qquad 00 \\
 \underline{18} \\
 00
 \end{array}$$

Much after the same manner, the greatest common measure of algebraical quantities is discovered; only the remainders that arise in the operation are to be divided by their simple divisors, and the quantities are always to be ranged according to the dimensions of the same letter. Thus, to find the greatest common measure of  $a^2 - b^2$  and  $a^2 - 2ab + b^2$ , the operation is thus:

$$\begin{array}{r}
 a^2 - b^2 \overline{)a^2 - 2ab + b^2(1} \\
 \underline{a^2 - b^2} \\
 -2ab + 2b^2 \text{ remainder, which} \\
 \text{divided by } -2b \text{ is reduced to} \\
 a - b \overline{)a^2 - b^2(a + b} \\
 \underline{a^2 - b^2} \\
 0
 \end{array}$$

Therefore,  $a - b$  is the greatest common measure required.

The ground of this operation is, that any quantity that measures the divisor

and the remainder (if there is any) must also measure the dividend; because the dividend is equal to the sum of the divisor multiplied into the quotient, and of the remainder added together. Thus, in the last example,  $a - b$  measures the divisor  $a^2 - b^2$ , and the remainder  $-2ab + 2b^2$ ; it must therefore likewise measure their sum  $a^2 - 2ab + b^2$ . You must observe, in this operation, to make that the dividend which has the highest powers of the letter, according to which the quantities are ranged.

Problem VIII. To reduce any fraction to its lowest terms: find the greatest common measure of the numerator and denominator; divide them by that common measure, and place the quotients in their room, and you shall have a fraction, equivalent to the given fraction, expressed in the lowest terms. Thus,  $\frac{3}{9}$  is reduced to  $\frac{1}{3}$ , by dividing the numerator and denominator by the greatest common measure 3. In the same manner  $\frac{75}{125} = \frac{3}{5}$  for  $25 = 4$ , and  $25 = 5$ .

In algebraical terms, the operation is thus:

$$\begin{array}{r}
 \frac{25bc}{25bc} \overline{) \frac{75abc}{125bcx} = \frac{3a}{5x}}; \text{ which is found} \\
 \text{by rejecting the divisor (as being nothing) rejecting the letters } bc \text{ of the} \\
 \text{dividend (as being common to numerator} \\
 \text{and denominator) and dividing the co-} \\
 \text{efficients 75 and 125 by their greatest} \\
 \text{common measure 25; the result of which} \\
 \text{is } \frac{3a}{5x}. \text{ In the same manner, } \frac{156a^2 + 572ab}{a^2 - 2ab + b^2} = \frac{156a^2 + 572ab}{a^2 - 2ab + b^2} \\
 = \frac{11a - 11b}{a^2 - 2ab + b^2} = \frac{a^2 - b^2}{a^2 - 2ab + b^2} \\
 = \frac{a - b}{a + b}; \frac{a^3 - b^3}{a^2 - 2ab + b^2} = \frac{a^2 - ba}{a + b}; \text{ and} \\
 \frac{a^4 - b^4}{a^5 - a^3b^2} = \frac{a^2 + b^2}{a^3}.
 \end{array}$$

When unit is the greatest common measure of the numbers and quantities, then the fraction is already in its lowest terms.

Thus,  $\frac{3ab}{5dc}$  cannot be reduced lower. It

ought also to be remarked, that numbers whose greatest common measure is unit, are said to be prime to each other.

If it is required to reduce a given fraction to a fraction equal to it, that shall have a given denominator; you must multiply the numerator by the given denominator, and divide the product by the former denominator; and this quotient, set over the given denominator, will be the fraction required. Thus, if it

were required to reduce  $\frac{2}{3}$  to an equal fraction, whose denominator shall be 6; find the quotient of  $2 \times 6 \div 3 = 4$ , then will  $\frac{4}{6}$  be the fraction required. In the

same manner,  $\frac{a}{b}$  is reduced to an equal fraction, which has the denominator  $c$ , viz.  $\frac{ac \div b}{c}$ ; for rejecting  $c$  out of both numerator and denominator, there remains  $a \div b = \frac{a}{b}$ .

For the method of reducing vulgar fraction to equal decimal ones, see the article DECIMAL.

It is observable, that when the last figure of the denominator of the fraction happens to be 1, 3, 7, or 9, then the decimal parts can never be precisely equal to the given fraction; yet by continuing the division, you may approximate to its value as near as you please. Thus  $\frac{2}{3} = .666666$ , &c. as far as you please; and, in the same manner,  $\frac{4}{7} = .5714285714$ , &c. Hence it may be farther observed, that these imperfect quotients return again, and circulate without end: in the first example, the circulation begins immediately; but, in the second, it does not begin again till the operation is continued to the seventh place; when the first six figures are repeated over again, constituting what is called the repetend of a decimal fraction. See the articles REPETEND and SERIES.

These repetends sometimes also happen, when other figures, besides those above-mentioned, are the denominator of the fraction. Thus  $\frac{1}{5} = .1666666$ , &c. *ad infinitum*.

**FRACTURE**, in surgery, a rupture of a bone, or a solution of continuity in a bone, when it is crushed or broken by some external cause.

Fractures generally happen when any part of the body, where a bone is situated, receives a violent shock, either by a fall, or a blow with a piece of timber, &c. or by the shot of a gun. There are instances where this accident has happened from an internal disorder, to wit, from the scurvy, a caries, or the venereal disease, which have rendered the substance of a bone so brittle, that it has been fractured without any apparent external accident. See CARIES, SCURVY, &c.

Fractures are distinguished into several classes. First, every fracture is either

simple, that is, when no other parts besides the bone are injured, or compound, as where there is a wound, a dislocation, hæmorrhage, inflammation, fever, caries, or contusion of the bone; or where the bone appears to be fractured in several places at the same time. Other differences arise with regard to the situation of the fracture; sometimes it happens in the cranium, ribs, vertebrae, sometimes in the upper or lower limbs; sometimes in the middle of the bone, and sometimes in either of the extremities. Again, some fractures are transverse, others oblique. In which case it frequently happens that the points of the bones wound the neighbouring parts, pushing quite through the muscular flesh, and common integuments; or at least pricking them grievously, and bringing on pain, inflammation, tumour, and spasm. Violent contusions also may be classed under the head of fractures; for the bones in this case are frequently broke into splinters, by the falling of any heavy body upon the part, or by any violent pressure. To fractures of the bones, we may also very properly add fissures. See the articles FISSURE, CONTUSION, &c.

Fractures of bones are discoverable, 1. By the eye, when the injured part is apparently shorter than the sound; or when the patient cannot make use of it. 2. By the touch, when a preternatural inequality of the bone may be perceived; or that it bends in a part where nature did not intend it should. 3. By the ear, when upon moving the limb, the crushing of the broken bones may be heard. 4. We may strongly suspect a fracture of the part, when it has received a violent blow. And, 5. It is observable that the parts are more subject to this injury in winter than in summer. Lastly, 6. Sometimes, particularly in fractures that are made in a transverse direction, the broken parts of the bone will immediately, of themselves, recover their natural situation, and leave little room to suspect the disorder.

Great variety of mischiefs attend a fractured bone, which differ, 1. With regard to the injured part, and the nature and disposition of the neighbouring parts. 2. With regard to the manner in which fractures are made; for oblique fractures, and those whose splinters and points wound and vellicate the neighbouring parts, are much more painful and dangerous than transverse fractures. 3. We may

may judge of the mischief that is likely to attend a fracture, from the number of pieces into which the bone is broken. And, 4. By observing whether the fracture happened at the middle of the bone, or at its extremities. The principal inconveniencies that attend a fracture are these: the patient loses the use of the limb; the lower part of the limb will be contracted by the muscles, which will make it appear distorted and deformed; the laceration of the periosteum and the vessels of the medulla being in great danger of fistulæ and caries. When the nerves are pricked and irritated by splinters, the patient suffers great pain, convulsions, inflammations, and fever; and if any vessels suffer pressure, the common consequences of a contusion ensue. Sometimes, whilst the bone is uniting, the broken parts are supplied in too plentiful a manner with juices, and the callus is formed irregularly, which occasions a deformity of the limb. See *CALLUS*.

In the cure of fractures, the surgeon's principal care should be to unite the broken bone, to which three things are necessary. 1. That the bone be restored to its natural situation, which is done by extending and replacing it. 2. That after the bone has recovered its natural situation, it be kept there, by giving it rest, and applying proper bandages. Lastly, proper remedies must be used, in order to prevent or remedy the disorders that usually attend this accident. See the articles *INFLAMMATION*, *FEVER*, &c.

When the fractured bones maintain their natural situation, you are under no necessity of extending or replacing the limb, but of applying a proper bandage; but when the fractured parts recede from each other, some degree of extension is necessary. See the article *EXTENSION of fractured limbs*.

Sometimes you will be troubled with splinters of the bone in your way, which render the reduction of the bone very difficult. If the splinters are free, and have no connection with the bone, you must remove them carefully. When they adhere to the principal parts, you should endeavour to replace them with the greatest exactness; and where they cannot be reduced or re-united with the bone, they may be removed by a strong pointed forceps. If they are concealed under the skin, you must endeavour to reduce them to their natural situation: if this cannot be done, make an incision through

the skin, and take them out. See the article *INCISION*.

The bones being properly replaced, the next thing to be done is to secure them in their situation, that they may unite to the best advantage.

To this end two things are chiefly required. 1. To bind it up properly. And, 2. To lay the limb in a convenient posture. The apparatus for securing the situation of the limb is composed of bandages, bolsters, and splints. See the articles *BANDAGE*, *BOLSTER*, and *SPLINT*. In fractures of the lower arm, after you have applied your bandage and dressings, you may suspend it in a scarf or sling, which is to hang from the neck: in fractures of the leg, you may rest the limb upon pillows, or in boxes, placing cushions or pillows under it: these machines are to be fastened to the limb with tapes, that it may remain fixed and immoveable.

*FRÆNUM*, in anatomy, a term applied to some membranous ligaments of the body. As,

*FRÆNUM LINGUÆ*, the ligament under the tongue, which sometimes ties it down too close to the bottom of the mouth; and then requires to be incised or divided, in order to give this organ its proper and free motion. This disorder generally arises in infants soon after their birth, so that they cannot move and exert their tongues in the action of sucking: though it is sometimes also observed in adults. For the operation of cutting the frænum, see the article *TONGUE-TIED*.

Each of the lips has also its peculiar frænum: the upper one under the nose; the under one near the roots of the dentes incisores: these are of the utmost service to us in speaking, and eating and drinking.

*FRÆNUM PENIS*, a ligament of the penis, that ties the prepuce to the lower part of the glans of the penis. See *PENIS*.

There is also a small frænum of the clitoris, by which it is connected to the ossa pubis. See the article *CLITORIS*.

*FRAGA*, a town of Arragon, in Spain, situated under the meridian of London: north lat. 41° 16'.

*FRAGARIA*, the *STRAWBERRY*, in botany, a genus of the *icosandria-pentagynia* class of plants, the corolla of which consists of five roundish, patent petals, inserted in the cup: there is no pericarpium; the common receptacle of the seed is of a roundish, oval figure, plane at the base, pulpy, large, soft, and deciduous; the

seeds

feeds are numerous, small, acuminate, scattered over the superficies of the receptacle, and not deciduous.

**FRAIGHT**, or **FREIGHT**, in commerce. See the article **FREIGHT**.

**FRAIL**, a basket made of rushes, or the like, in which are packed up figs, raisins, &c. It signifies also a certain quantity of raisins, about 75 pounds.

**FRAISE**, in fortification, a kind of defence, consisting of pointed stakes, six or seven feet long, driven parallel to the horizon into the retrenchments of a camp, a half-moon, or the like, to prevent any approach or scalade.

Fraises differ from palisades chiefly in this, that the latter stand perpendicular to the horizon, and the former jet out parallel to the horizon, or nearly so, being usually made a little sloping, or with the points hanging down. Fraises are chiefly used in retrenchments and other works thrown up of earth; sometimes they are found under the parapet of a rampart, serving instead of the cordon of stone used in stone-works.

To **FRAISE a battalion**, is to line the musqueteers round with pikes; that, in case they should be charged with a body of horse, the pikes being presented, may cover the musqueteers from the shock of the horse, and serve as a barricade.

**FRAME**, in joinery, a kind of case, wherein a thing is set or inclosed, or even supported, as a window-frame, a picture-frame, &c.

**FRAME** is also a machine used in divers arts; as,

**FRAME**, among printers, is the stand which supports the cases. See the article **CASE**.

**FRAME**, among foundry, a kind of ledge inclosing a board, which, being filled with wetted sand, serves as a mould to cast their works in. See **FOUNDRY**.

**FRAME** is more particularly used for a sort of loom, whereon artificers stretch their linnens, silks, stuffs, &c. to be embroidered, quilted, or the like.

**FRAME**, among painters, a kind of square, consisting of four long slips of wood joined together, whose intermediate space is divided by threads into several little squares like a net; and hence sometimes called *reticula*. It serves to reduce figures from great to small; or, on the contrary, to augment their size from small to great.

**FRAMING of an house**, among carpenters, denotes all the timber-work therein; namely, the carcase, flooring, partition-

ing, roofing, ceiling, beams, ashlering, &c. all together. See **FLOORING**, &c.

**FRAMPOLE-FENCES**, a privilege enjoyed by the tenants of the manor of Writtel in Essex, whereby they are intitled to the wood growing on the fence, and as many poles as they can reach from the top of the ditch with an axe's helve, towards the repair of their fences.

**FRANC**, or **FRANK**. See **FRANK**.

**FRANCA**, in botany, the same with *frankenia*. See the article **FRANKENIA**.

**FRANCE**, a large kingdom of Europe, situated between 5° west and 7° east long. and between 43° and 51° north lat. being bounded by the english channel and the austrian Netherlands, on the north; by Germany, Switzerland, Savoy, and Piedmont, in Italy, on the east; by the Mediterranean sea, and the Pyrenean mountains, which separate it from Spain, on the south; and by the bay of Biscay, on the west. This kingdom was formerly divided into twelve provinces, but at present it is divided into twenty-five general governments, over every one of which is an officer, called an intendant, appointed by the king, who has a power of controuling the governor, and all other officers of justice; and presides over the receivers-general of his generality.

**FRANCFORT**, a city of Germany, situated on the confines of Hesse and Franconia, on both sides of the river Maine: east longitude 7° 30' north lat. 50° 10'.

**FRANCFORT on the Oder**, a city of Germany in the circle of upper Saxony, and marquisate of Brandenburg, situated in east long. 15°, north lat. 52° 22'.

**FRANCHE-COMTE**, the same with the county of Burgundy. See **BURGUNDY**.

**FRANCHE-COMTE**, a province of France bounded by Lorrain on the north; by Alsace and Switzerland, on the east; by La Breis and Bugey, on the south; and by the dukedom of Burgundy, on the west.

**FRANCHISE**, in a general sense, a privilege or exemption from ordinary jurisdiction; as that for a corporation to hold pleas among themselves to such a value, or the like.

**FRANCHISE** is sometimes used for an immunity, from tribute, in which sense it is either personal or real; that is, belonging to a person immediately, or else by means of this or that place of which he is chief, or a member.

A Franchise may be vested either in bodies



bodies politic, or corporations; in borough towns, or in any single person. There are franchises of different kinds, as the principality of Wales, counties palatine, counties, hundreds, parts of the sea, &c. Besides which there is a franchise of having a leet, manor, or lordship; as also of fairs and markets, felon's goods; as also the goods of fugitives and outlaws; deodands, treasure-trove, waifs, estrays, wrecks, &c.

Franchises and liberties, being usually held by charter, are all said to be derived from the crown, but some lie in prescription without the help of any charter.

**FRANCHISE ROYAL**, seems to be that where the king's writ does not run; but Bracton says, that a franchise royal, is where the king grants to one and his heirs an exemption of toll, &c.

**FRANCHISE** is also used for an asylum or sanctuary, where people are secure of their persons. See **ASYLUM**.

**FRANCHISE of quarters**, a certain place or district at Rome, wherein are the houses of the ambassadors of the princes of Europe; and where such as retire cannot be arrested or seized by the sbirri or sergeants, nor prosecuted at law.

Several of the popes published their bulls and ordinances against the abuse made of this privilege, which rescued so considerable a part of the city, by the enlargement of these places, from their authority, and rendered them a retreat for the most abandoned persons. At last Innocent XI. expressly refused to receive any more ambassadors, but such as would make a formal renunciation of the franchise of quarters.

**FRANCIGENÆ**, in our old law-books, an appellation given to foreigners in general.

**FRANCISCAN MONKS, FRIARS MINOR**, or **GREY FRIARS**, religious of the order of St. Francis, founded by him in the year 1209. See the article **FRIAR**.

The rule of the franciscans, as established by St. Francis himself, is briefly this: they are to live in common, to observe chastity, and to pay obedience to the pope and their superiors.

Before they can be admitted into the order, they are obliged to sell all they have, and give it to the poor: they are to perform a year's noviciate, and when admitted, never to quit the order upon any account. They are to fast from the feast of All-saints, to the Nativity. This order has produced four popes, forty-

two cardinals, and an infinite number of patriarchs. The franciscans had sixty-three monasteries in England, one of which was in the parish of St. Nicholas in London.

**FRANCOLINI**, a town of Italy, situated on the river Po, about nine miles north-east of Ferrara.

**FRANCONIA**, a circle of the german empire, lying between Bohemia on the east, and the electorate of Mentz on the west. Its capital is Nuremburg; and from this country the Franks, who conquered and gave name to the kingdom of France, are said to have come.

**FRANGIPANE**, a kind of exquisite perfume given to the leather of which gloves, &c. are made.

There is likewise a perfumed liquor of the same name, as also a ros solis.

**FRANGULA, BLACK ALDER**, a distinct genus of plants according to Tournefort, but ranked by Linnæus among the rhamnuses. See **RHAMNUS**.

**FRANGULÆ SPECIES**, in botany, the name by which Dillenius calls the maurocena of Linnæus. See **MAUROCENIA**.

**FRANK**, or **FRANC**, meaning literally free from charge and impositions, or exempt from public taxes, has various significations in our antient customs.

**FRANK ALMOIGN**, signifies a tenure by spiritual service, where lands or tenements are held by an ecclesiastical corporation, sole or aggregate, to them and their successors, of some lord and his heirs, in free and perpetual alms.

This is an antient tenure chiefly to be met with in grants to religious houses, colleges, &c. No person can have lands in frank almoign, unless it is by prescription, or on a grant made before the statutes of mortmain; so that the tenure may not be created at this day. Nevertheless the king is not restrained by the statutes, nor a subject licensed or dispensed with by him to make such a grant; and if an ecclesiastical person holds lands at a certain rent, &c. the lord may confirm his estate to hold to him and his successors in frank almoign.

**FRANK CHACE**, is defined to be a liberty of free chace, whereby persons that have lands within the compass of the same, are prohibited to cut down any wood, &c. out of the view of the forester.

**FRANK FEE**, signifies the same as holding lands and tenements in fee simple; that is, to any person and his heirs, and not by such service as is required by antient demesne,

demesne, but is pleaded at common law. See the article **FEE**.

**FRANK FERM**, antiently signified lands changed in the nature of the fee by feoffment, &c. out of the knight's service for other certain yearly services.

**FRANK FOLD**, is where the lord has the liberty of folding his tenants sheep within his manor. See the article **FALDAGE**.

**FRANK-INCENSE**, in natural history, &c. See the article **INCENSE**.

**FRANK LANGUAGE**, or **LINGUA FRANCA**, a kind of jargon spoken on the Mediterranean, and particularly throughout the coasts and parts of the Levant, composed of Italian, Spanish, French, vulgar Greek, and other languages.

**FRANK LAW**, a word applied to the free and common law of the land, or the benefit a person has by it.

He that for any offence loseth this frank law, incurs these inconveniences, *viz.* He may not be permitted to serve on juries, nor used as an evidence to the truth; and if he has any thing to do in the king's court, he must not approach it in person, but appoint his attorney; his lands, goods, and chattels shall be seized into the king's hands; and his lands be estranged; his trees rooted up, and his body committed to custody.

**FRANK-MARRIAGE**, is where a person, seized in fee of lands or tenements, has given them to another with his daughter, sister, or some woman otherwise of kin to him, in free marriage, by virtue of which the husband and wife have an estate in special tail, and shall hold the land of the donor, discharged of all services, except fealty, to the fifth degree.

**FRANK PLEDGE**, in our law, signifies a pledge or surety for the behaviour of freemen.

According to the antient custom of England, for the preservation of the public peace, every free-born man, at the age of fourteen, except religious persons, clerks, knights, and their eldest sons, was obliged to give security for his truth and behaviour towards the king and his subjects, or else be imprisoned. Accordingly, a certain number of neighbours became interchangeably bound for each other, to see each person of their pledge forth-coming at all times, or to answer for the offence of any one gone away; so that whenever any person offended, it was presently inquired in what pledge he was; and there the persons bound either produced the offender in thirty-

one days, or made satisfaction for his offence.

**FRANK SERVICE**. See the article **SERVICE**.

**FRANK TENEMENT**, is said to be a possession of freehold lands or tenements. See **FREEHOLD** and **TENEMENT**.

**FRANK**, or **FRANC**, an antient coin, either of gold or silver, struck and current in France. The value of the gold-frank was somewhat more than that of the gold crown; the silver-frank was a third of the gold one: this coin is long out of use, though the term is still retained as the name of a money of account; in which sense it is equivalent to the *livre*, or twenty *sols*.

**FRANKENDAL**, a city of Germany, in the palatinate of the Rhine, situated on the west side of the river Rhine, in east long. 8° 15', north lat. 49° 30'.

**FRANKENIA**, **SEA-HEATH**, or **SEA-CHICKWEED**, a genus of the *decandria-monogynia* class of plants, the flower of which consists of five petals, with a plain limb: the fruit is an oval, unilocular capsule, covered by the cup, and containing a great many ovated very small seeds.

**FRANKENSTEIN**, a town of Germany, in the palatinate of the Rhine, and dutchy of Zuebruggen, situated twelve miles north-west of Landau.

**FRANKER**, a town of the United-provinces, in the province of west Friesland, nine miles west of Lewarden.

**FRANKINCENSE**, *olibanum*, in the materia medica. See **OLIBANUM**.

**FRANKS**, **FRANKIS**, or **FRANQUIS**, an appellation given by the Turks, and other nations of Asia, to all the people of the western parts of Europe, to which they give the name of Frankistan.

**FRANSTAT**, or **FRAUSTAT**, a town of Silesia, situated twenty-five miles north-east of Glogaw, subject to Prussia.

**FRASCATI**, or **FRESCATI**, a town of Italy, in the campania of Rome, thirteen miles east of that city, near which place is the tusculum of Cicero, called Grotto Ferrate.

**FRATERCULA**, in zoology, the name by which Gesner calls the arctic duck. See the article **DUCK**.

**FRATERNITY**, in the roman catholic countries, signifies a society for the improvement of devotion.

Of these there are several sorts; as, 1. The fraternity of the rosary, founded by St. Dominic: it is divided into two branches, called the common rosary, and the perpetual

petual rosary; the former of whom are obliged to confess and communicate every first Sunday in the month, and the latter to repeat the rosary continually. See the article ROSARY.

2. The fraternity of the scapulary, whom the blessed virgin, according to the fabbatin bull of pope John XXII. has promised to deliver out of hell the first Sunday after their death. See SCAPULARY.

3. The fraternity of St. Francis's girdle, are clothed with a sack of a grey colour, which they tie with a cord; and, in processions, walk bare-footed, carrying in their hands a wooden cross.

4. That of St. Austin's leathern girdle, comprehends a great many devotees.

Italy, Spain, and Portugal, are the countries where one sees the greatest number of these fraternities, some of which assume the name of arch-fraternities. Pope Clement VII. instituted the arch-fraternity of charity, which distributes bread every Sunday among the poor, and gives portions to forty poor girls on the feast of St. Jeron their patron.

The fraternity of death, buries such dead as are abandoned by their relations, and causes masses to be celebrated for them.

The fraternity of St. Mary of the suffrage, employ their prayers to release souls out of purgatory. The fraternity of mercy, at Lisbon, consists of persons of the greatest quality, the king himself being a member of it; the design of its institution is to procure a great number of masses to the faithful, but chiefly to its own members.

What has been said, may suffice to shew the nature of these fraternities; by entering into which, most of the devotees believe they are much surer of salvation, than they could otherwise be.

FRATERNITY, in a civil sense, a company or gild of certain artificers or traders.

See the articles COMPANY and GILD.

FRATRICELLI, LITTLE BROTHERS, in church history, a sect of heretics who appeared in Italy about the year 1298, and afterwards spread all over Europe. They wore the habit of the franciscan order, and pretended that ecclesiastics ought to have no possessions of their own.

FRATRIAGE, *fratriagium*, the partition among brothers or coheirs, coming to the same inheritance or succession.

Fratriage more particularly signifies a younger brother's inheritance; or whatever the younger sons possess of the father's estate, which, in our antient law,

they are said to enjoy *ratione fratriagii*; and were to do homage for the same to the elder brother, he being bound to do homage to the superior lord for the whole.

FRATRES ARVALES. See ARVALES.

FRATRES CONJURATI, in our antient law-books, &c. signify sworn brothers, or those who took an oath to defend the king against his enemies.

FRATRICIDE, the crime of murdering one's brother. See PARRICIDE.

FRAUD, in law, signifies deceit in grants, or conveyances of lands, &c. or in bargains and sales of goods, &c. to the damage of another person.

A fraudulent conveyance of lands or goods to deceive creditors, as to creditors is void in law. And a fraudulent conveyance in order to defraud purchasers, is also to such purchasers void; and the persons justifying or putting off such grants as good, shall forfeit a year's value of the lands, and the full value of the goods and chattels, and likewise shall be imprisoned.

However, when conveyances are fraudulently made, they are not void to all persons, but only to those that afterwards come to the land as purchasers on good consideration. A general gift made of all the goods of a person, may be reasonably suspected to be by fraud, even though a true debt is owing to the party to whom made; and it is void against other creditors of the donor. Here the several marks of fraud in a gift or grant of goods, are as follow, *viz.* 1. If it be general, without any exception of some things of necessity. 2. If the donor continues to possess and use the goods. 3. If the deed be made in secret. 4. If there be a trust between the parties; or, 5. If made whilst the action is depending.

Where a person is party to a fraud, all that follows thereupon will be intended to be done by him, though fraud shall not be presumed or adjudged to be so, until found by jury.

By the statute of frauds, 29 Car. II. agreements for the sale of lands, leases, &c. are required to be in writing. See 3 & 4 Will. and Mary, c. 14.

FRAUS LEGIS, is where the process of the law is used with a felonious purpose; and a person is turned out of possession of his house, by virtue of a writ of habere facias possessionem, on a false affidavit procured of the service of a declaration in

ejection and judgment had thereon in fraudem legis.

**FRAXINELLA**, in botany, the same with dictamnus. See **DICTAMNUS**.

**FRAXINUS**, the **ASH**, in botany, a genus of trees, belonging to the *polygamia-dioecia* class, in some species of which there is no corolla; in others there is a small one, formed of four slender and acute petals: the fruit is single, of a compressed lanceolate figure, and is what we commonly call the ash-key, several clusters of which are affixed to the same common pedicle.

The wood of this tree is in great use among several artificers, as wheel-wrights, cart-wrights, carpenters, turners, &c. also for making ploughs, harrows, axle-trees, oars, balls, &c. It is said to be as lasting for building as oak, and often preferred before it: though the timber of the trunk greatly excels that of a bough. Some ash is also so curiously veined, that the cabinet-makers equal it to ebony, and call it green ebony; so that the woodmen, who light upon such trees, may have for it what they will. The season for felling this tree, is from November to February; for if cut down too early, or too late, it is liable to the worm. The ash is hurtful to corn-lands, and therefore should be planted either in hedges or clumps, at about nine or ten feet distance.

**FRAY**, among sportsmen. A deer is said to fray its head, when it rubs it against a tree, to cause the pills of the new horns to come off. See the article **HEAD**.

**FREAM**, a name given by farmers to plowed lands worn out of heart, and laid fallow till it recover. See **FALLOWING**.

**FREAM**, among sportsmen, denotes the noise of a boar in rutting time.

**FRECKLES**, *lentigines*, spots of a yellowish colour, of the bigness of a lentile-seed, scattered over the face, neck, and hands. Freckles are either natural, or proceeding accidentally from the jaundice, or the action of the sun upon the part. Heat, or a sudden change of the weather, will often cause the skin to appear of a darker colour than natural, and thereby produce what is called tan, sunburn, and morpew, which seem to differ only in degree; and usually disappear in winter. See the article **TAN**, &c.

Persons of a fine complexion, and such whose hair is red, are the most subject to freckles, especially in those parts which they expose to the air.

To remove freckles, put juice of lemons in a glass-vial, and mixing it with sugar and borax, finely powdered, let it digest eight days, and then use it. Homberg proposes bullock's gall, mixed with alum, and, after the alum has precipitated, exposed three or four months to the sun in a close vial, as one of the best remedies known for the removing of freckles.

**FREDENBERG**, a town of Germany, in the circle of Westphalia, fifty miles west of Cassel.

**FREDERICA**, a town of Georgia, in North America, situated in west long. 81° 30', north lat. 31°, on the island of St. Simons, in the mouth of the river Alatomaha.

**FREDERICKSBURG**, a castle and palace of the king of Denmark, situated in the isle of Zeland, twenty miles north-west of Copenhagen, built upon piles in the middle of a lake.

**FREDERICKSBURG**, a fort upon the gold coast of Guinea, near cape Three-points, subject to the Danes. It lies in west long. 2°, north lat. 5°.

**FREDERICKSHALL**, a strong town of Norway, in the province of Agerhuys, situated on the frontiers of Sweden, thirty miles north of Frederickstad.

**FREDERICKSODE**, a town of Jutland, in the province of Reypen, situated on the little belt in the Baltic-sea, twenty miles west of Odensee.

**FREDERICKSTAT**, a town of Sleswick, or south Jutland, situated on the river Eyder, near the german ocean, thirty-one miles west of Sleswick.

**FREDERICKSTAT**, a town of Norway, in the principality of Agerhuys, situated on a bay of the sea, called the Schagger-rack, near the frontiers of Sweden: east long. 11° 24', north lat. 59°.

**FREE**, in a general sense, is used in opposition to whatever is constrained or necessitated. When applied to things endowed with understanding, it more peculiarly relates to the liberty of the will. See the article **FREEDOM**.

**FREE**, among seamen. The pump is said to free the ship, when it throws out more water than leaks into her. To free the boat, is haling or lading out the water therein.

**FREE-BENCH**, signifies that estate in copyhold which the wife, being espoused a virgin, has after the decease of her husband for her dower, according to the custom of the manor.

In regard to this free-bench, different manors

manors have different customs, and in the manor of east and west Enbourne in the county of Berks, and in other parts of England, there is a custom, that when a copyhold tenant dies, the widow shall have her free-bench in all the deceased husband's lands, *dum sola & casta fuerit*, whilst she lives single and chaste; but if she is found to be guilty of incontinency, she shall forfeit her estate. Nevertheless, upon her coming into the court of the manor riding backwards on a black ram, with his tail in her hand, rehearsing a certain form of words, the steward is bound by custom to restore her to her free-bench.

**FREE-BORD**, ground claimed in some places beyond or without the fence, and said to contain two foot and an half.

**FREE-CHAPEL**, is properly a chapel of the king's foundation, and by him exempted from the ordinary's visitation or jurisdiction.

**FREE**, or **IMPERIAL CITIES**, in Germany, are those not subject to any particular prince, but governed, like republics, by their own magistrates. See **CITY**.

**FREE-FAIR.** } See the articles { **FAIR**.

**FREE-FEE.** } See the articles { **FEE**.

**FREE-HOLD**, signifies lands or tenements which a person holds in fee-simple, fee-tail, or for term of life.

Freehold is distinguished into freehold in deed, and freehold in law: the first of which signifies the real possession of lands, &c. in fee, or for life; the other is the right that a person has to such lands or tenements before his entry.

**FREE-HOLD** is also extended to such offices as a man holds in fee, or during life. See the article **FEE**.

A freehold, by the common law, cannot commence in futuro, but it must take effect presently, either in possession, reversion, or remainder; and where a person pleads liberum tenementum, or freehold, generally the law intends he has an estate in fee, and not barely for life. Whatever is part of the freehold, goes to the heir; and things fixed thereto, may not be taken as a distress for rent, or in execution, &c. No person shall distrain freeholders to answer for their freehold, or any thing concerning the same, without the king's writ. By the antient laws of Scotland, freeholders are called milites, or knights.

**FREE-MASON.** See the article **MASON**.

**FREE-PART.** See the article **PART**.

**FREE-STATE**, a republic governed by magistrates elected by the free suffrages of the inhabitants.

**FREE-STONE**, a whitish stone dug up in many parts of England, that works like alabaster, but is more hard and durable; being of excellent use in building, &c. It is a kind of the grit-stone, but finer sanded, and a smoother stone, and is called free, from its being of such a constitution as to cut freely in any direction: such is the Portland-stone, and the free-stone of Kent.

**FREE-STOOL.** See **FRID-STOLL**.

**FREE-THINKER.** See the article **DEIST**.

**FREE-WARREN**, the power of granting or denying licence to any one to hunt in such and such ground.

**FREEDOM**, in general, the state or quality of being free. See **FREE**.

**FREEDOM of a corporation**, the right of enjoying all the privileges and immunities belonging to it. See **CORPORATION**.

The freedom of cities, and other corporations, is regularly obtained by serving an apprenticeship; but it is also purchased with money, and sometimes conferred by way of compliment.

**FREEDOM of the will**, that power or faculty of the mind, whereby it is capable of acting or not acting, choosing or rejecting, whatever it judges proper. Of this every man must be sensible, who finds in himself a power to begin or forbear, continue or end several actions, barely by a thought or preference of the mind. The actual exercise of this power, is that which we call volition or willing; and the agent, capable of acting in this manner, is denominated free, and the actions he performs, voluntary. Whereas, on the other hand, wherever any performance or forbearance are not equally in a man's power; wherever doing or not doing will not equally follow upon the preference of his mind, there he is not free, though perhaps the action may be voluntary. To illustrate this, suppose a man to be carried whilst fast asleep into a room where is a person he longs to see, and be there locked fast in, beyond his power to get out; he awakes, and is glad to see himself in so desirable company, which he stays willingly in; that is, prefers his staying to going away. In this case, his stay is voluntary; and yet being locked fast in, he is not at liberty to stay, he has not freedom to be gone. So that liberty does not consist in the preference

ference of the mind, but in the power of conforming to that preference.

**FREEDOM of contrariety**, among moralists, that of choosing either of two opposites, as virtue or vice, good or evil; concerning which the received doctrine is, that mankind have a freedom of contradiction, but not of contrariety; that is, they may abstain from the pursuit of virtue and good, but are incapable of hating them, or of preferring their opposites. See the article **CONTRADICTION**.

**FREEDOM of conscience**. See **TOLERATION**.  
**FREEZE**, or **FRIEZE**, in architecture. See the article **FRIEZE**.

**FREEZE**, or **FRIEZE**, in commerce, a coarse kind of woollen stuff, or cloth, for winter-wear; so called, as being freezeed or naped on one side.

Irish frieze pays, on importation, a duty of  $5\frac{1}{2}\frac{1}{100}$  d. for every yard; and draws back, on being exported,  $4\frac{8}{100}$  d. per yard.

**FREEZING**, in philosophy, the same with congelation. See **CONGELATION** and **FROST**.

Philosophers are by no means agreed as to the cause of this phenomenon. The cartesian account for it by the recess or going out of the ethereal matter from the pores of the water. The corpuscularians, on the other hand, attribute it to the ingress of frigorific particles, as they call them; and Hobbes asserts, that these particles are nothing else but common air, which entangling itself with the particles of water, prevents their motion. Others will have a kind of nitrous salt to be the cause of congelation, by insinuating itself between the particles of water, and fixing them together, like nails. And, indeed, it seems probable that cold and freezing do arise from some substance of a saline nature floating in the air; since all salts, and particularly nitrous ones, when mixed with ice and snow, greatly increase their cold, and even bulk.

Boerhaave observes, that it is extremely difficult to exhibit to the eye the precise degree of cold wherein ice begins to form; since heat and cold, once given to a body, adhere long to it before they quit it. When the air, therefore, is in such a state as keeps Fahrenheit's thermometer at 32 degrees, water will not freeze; because water being 800 times denser than air, retains the warmth considerably longer than air. If any person, there-

fore, is curious to know in what degree of cold water begins to freeze, let him first suspend a thermometer in a free open air on all sides; and then wetting a thin linnen cloth with clear water, and hanging it likewise in the open air, it will grow stiff upon the first access of the freezing cold, and thereby shew when water is beginning to turn to ice. See the article **THERMOMETER**.

By means of freezing, wine, vinegar, and malt-liquors may be reduced to a fourth part of their quantity, without any considerable loss of their essential parts; since only the aqueous parts freeze, leaving the vinous parts concentrated or brought into less compass, and capable of being transported with less expence, and keeping for several years.

**FREEZING MIXTURE**. Mr. Boyle shews in his history of cold, that not only all kinds of salts, but likewise spirits, sugar, and saccharum saturni, mixed with snow, are capable of freezing most fluids; and the same effect was also produced by the mixture of oil of vitriol, or spirit of nitre, with snow.

**FREEZING RAIN**, that which falls in form of ice, or which freezes as soon as it reaches the ground.

**FREEZELAND**, or **FRIESELAND**. See the article **FRIESELAND**.

**FREIGHT**, or **FRAIGHT**, in navigation and commerce, the hire of a ship, or a part thereof, for the conveyance and carriage of goods from one port or place to another; or the sum agreed on between the owner and the merchant, for the hire and use of a vessel.

The freight of a vessel is usually agreed on either at the rate of so much for the voyage, or by the month, or per ton. Wherever a ship freighted by the voyage, or by the month, is cast away, plundered by pirates, or taken by the enemy, the freight becomes lost; but if the merchant, or any other who hires the ship, agrees by the run, or after such a rate for every piece of the commodities on board, and that part of the goods are saved, it is there held that the ship ought to have her freight, according to the rate of the goods saved. The lading of a ship, in law construction, is bound for the freight; and where goods are put aboard, and the ship has broke ground, a merchant may not afterwards unlade them: for if he then changes his mind, and resolves not to venture, by the marine law, freight is due. Likewise, if the freighter of a ship lade

lade on board any prohibited goods, or unlawful merchandize, whereby the vessel is detained or impeded in her voyage, he shall answer the freight agreed : but where a master freights out his ship, and afterwards takes in goods secretly and unknown to the first laders, he forfeits such freight. In case any ship is freighted out and in, no freight will be due till the voyage is performed ; and here if a vessel be loit in coming home, the freight outwards and inwards are both lost.

If a whole vessel be hired, and the merchant or person who hires it do not give it full load or burden, the master of the vessel cannot, without his consent, take in any other goods without accounting to him for freight. Though the merchant do not load the quantity of goods agreed on in the charter-party, yet he shall pay the whole freight ; and if he load more, he shall pay for the excess. See the article CHARTER-PARTY.

The master may set ashore such goods as he finds in his vessel, which were not notified to him ; or take them at a higher rate than was agreed on for the rest. If a ship be stopped or detained in its course, either through the merchant's or the master's fault, the delinquent shall be accountable to the other. If the master be obliged to reftit his vessel during the voyage, the merchant shall wait, or else pay the whole freight : if the vessel could not be refitted, the master is obliged to hire another immediately, otherwise only to be paid his freight in proportion to the part of the voyage he performed : tho' in case the merchant prove that the vessel, at the time it set sail, was not capable of the voyage, the master must lose his freight, and account for damages to the merchant.

Freight shall be paid for merchandizes which the master was obliged to sell for victuals, refitting, or other necessary occasions, paying for the goods at the rate the rest were sold at where they were landed. In case of a prohibition of commerce with the country whither the vessel is bound, so that it is obliged to be brought back again, the master shall only be paid freight for going. And if a ship be stopped or detained in its voyage by an embargo, by order of the prince, there shall neither be any freight paid for the time of detention, in case it be hired *per month*, nor shall the freight be increased, if hired by the voyage : but the pay and victuals of the sailors, during the deten-

tion, shall be deemed average. See the article AVERAGE.

FREIGHT is also used for the burden, or lading of a ship, or the cargo of goods, &c. which she has on board.

FREIGHT also signifies a duty of fifty sols *per tun* paid to the crown of France by the masters of foreign vessels going in or out of the several ports of the kingdom.

It is to be observed, that all vessels not built in France, are accounted foreign, though belonging to the king's subjects ; and, as such, are liable to the payment of this impost, unless otherwise exempted, or that two thirds of the crew are French. The Dutch and the hans towns are exempted from the duty of freight.

FRENCH, in general, something belonging to France : thus we say, the french language, french customs, polity, &c. The french language is made up of latin, greek, teutonic, and the language spoken by the old Gauls. It is natural, and easily pronounced, and therefore used by most nations of Europe in conversing with foreigners. There are very few compound words in french, which is acknowledged to be to its disadvantage. It has also few diminutives ; but as to purity, easiness, and flexibility, it yields to none.

FRENCH BREAD.

FRENCH COINS.

FRENCH CROWN.

FRENCH WEIGHT, &c.

FRÆNUM, or FRÆNUM, in anatomy.

See the article FRÆNUM.

FRENZY, or PHRENZY, in medicine. See the article PHRENZY.

FRESCO, a method of painting in *relievo* on walls, so as to endure the weather.

It is performed with water-colours on fresh plaster ; or on a wall laid with mortar not yet dry. This sort of painting has a great advantage by its incorporating with the mortar, and drying along with it, becomes very durable.

The compost should be made of rubbish stones mixt with well-burnt flint, or lime, and water : but the saltness of the lime must be washed out, by pouring water frequently on it. But this should not be done in moist weather.

To prevent the plaster from peeling, strike into the joints of the wall stumps of horse-nails six inches distant from each other. First plaster the walls pretty thick ; then let it dry for some time, the design and colours being first ready prepared. This painting is chiefly performed

formed on walls and vaults newly plastered with lime and sand; and the plaster is only to be put on in proportion as the painting proceeds.

Plaster the wall a second time, about the thickness of half a crown, only so much as you intend to work upon; and while it is wet, work the colours therein, which will incorporate with the plaster so as never to wash out.

The painting must be worked with a free hand, and your colours made high enough at first, as there can be no alteration made after the first painting.

In this work scarce any thing else is used but earths, which still retain their colour, defending it from the burning and salt of the lime. The colours are white, made of lime slacked some time, and white marble dust, red and yellow oker, violet red, verditer, lapis lazuli, smalt, black spanish brown, spanish white, &c. all which are ground and worked up with water.

The brushes and pencils for this work must be long and soft, or else they will rake and raze the painting: the colours must be full and flowing from the brush, and the design or cartoon must be perfect in the paper-copy.

The antients painted on stucco; and we may remark in Vitruvius what infinite care they took in making the incrustations or plastering of their buildings, to render them beautiful and lasting; tho' the modern painters find a plaster made of lime and sand preferable thereto.

**FRESH**, in general, something that is new, pure, and good; or, that has little or no salt in it.

**FRESH DISSEISIN**, in law, such a disseisin as a man may defeat of himself, and by his own power, without the assistance of the king or the law; as where it is of short continuance, *viz.* not above fifteen days. See the article **DISSEISIN**.

**FRESH FINE**, a fine that was levied within a year past. See the article **FINE**.

**FRESH FORCE**, signifies a force newly done; as where a person is disseised of any lands or tenements within a city or borough, or deforced of lands after the decease of his ancestor, to whom he is heir; the person having right may within forty days after the force committed, or title to him accrued, bring his assise or bill of fresh force; and recover the lands. See the article **FORCE**.

**FRESH HAWSE**, among seamen. See the article **HAWSE**.

**FRESH SHOT**, in the sea-language, signi-

fies the falling down of any great river into the sea, by means whereof the sea hath fresh water a good way from the mouth of the river. As this is more or less, they call it a great or small fresh shot.

**FRESH SPELL**, in the sea-phraze, a fresh gang to relieve the rowers in the long-boat.

**FRESH SUIT**, in law, is such a close and active prosecution of an offender, as never ceases from the time of the offence committed or discovered, till he is apprehended.

The benefit and effect of this pursuit of a felon is, that the party pursuing shall have his goods again, which otherwise would be forfeited to the king. A person may be said to make a fresh suit tho' he does not take the thief presently, but some time after the robbery is committed, provided he has used his utmost endeavours to take him; and though the criminal was taken by another person not interested in any thing carried away, yet the party robbed shall be deemed to have made a fresh suit.

**FRESH WATER**. See the article **WATER**.

**FRET**, or **FRETTE**, in architecture, a kind of knot or ornament, consisting of two lists or small fillets variously interlaced or interwoven, and running at parallel distances equal to their breadth. See plate CVI. n<sup>o</sup> 7.

Every return and intersection of these frets must be at right angles, otherwise they lose all their beauty, and become perfectly gothic. Sometimes the fret consists but of a single fillet, which, if well disposed, may be made to fill its space exceedingly well. Frets were very much used by the antients, especially on even flat members, or parts of a building, as the faces of the corona, and eaves of corniches; under the roofs, soffits, &c. and on the plinths of bases, &c. See the articles **CORONA**, **EVE**, &c.

**FRET**, in heraldry, a bearing composed of six bars, crossed, and variously interlaced, as represented in plate CVII. fig. 2.

Some call it the true-lover's knot.

**FRET**, in music, signifies a kind of stop on some instruments, particularly bass-viol and lutes. Frets consist of strings tied round the neck of the instrument, at certain distances, within which such and such notes are to be found.

**FRET-WORK**, that adorned with frets. It is sometimes used to fill up and enrich flat empty spaces; but is mostly practised



tised in roofs, which are fretted over with plaster-work. The Italians also use fret-works in the mantling of chimneys, with great figures: a cheap piece of magnificence, and as durable almost within doors, as harder matters in the weather.

**FRETTY**, in heraldry, an appellation given to bearings made up of six, eight, or more bars laid across each other, in the manner of frets. See **FRET**.

**FREYSTAT**, a town of Silesia, in Germany, east long.  $17^{\circ} 55'$ , north lat.  $50^{\circ}$ .

**FRIABLE**, among naturalists, an appellation given to bodies that are easily crumbled to pieces: such are the free-stone, pumice-stone, &c.

**FRIAR**, or **FRIER**, from the French *frere*, a brother, a term common to monks of all orders, founded on this, that there is a kind of fraternity, or brotherhood, between the several religious persons of the same convent or monastery.

Friars are generally distinguished into these four principal branches, *viz.* 1. Minors, grey friars, or franciscans. 2. Augustines. 3. Dominicans, or black friars. 4. White friars, or carmelites. From these four the rest of the orders descend. See the articles **FRANCISCANS**, **AUGUSTINES**, &c.

**FRIAR**, in its more peculiar and proper sense, is restrained to such monks as are not priests, for those in orders are generally dignified with the title of father. See **MONK** and **FATHER**.

**FRIAR OBSERVANT**, is a branch of the franciscan friars; thus called, because they are not combined together in any cloister, convent, or corporation, as the conventuals are; but have bound themselves only to observe the rules of their order more strictly than the conventuals do, from whom they separated, out of a singularity of zeal, living in certain places of their own choosing.

**FRIAR'S COUL**, in botany, a name given to several species of arum. See the article **ARUM**.

**FRIBURG**, the capital of a canton of the same name in Switzerland, situated eighteen miles south-west of Bern: east long.  $6^{\circ} 55'$ , north lat.  $46^{\circ} 50'$ .

**FRIBURGH**, a city of Swabia, in Germany, twenty-eight miles south of Strasbourg.

**FRIBURGH**, or **FRIDBURGH**, in our old customs, the same with frank pledge. See the article **FRANK**.

**FRICASSEE**, in cookery, a dish hastily dressed in a frying-pan, with butter, oil,

or the like. Thus we say, a fricassee of pullets, tripe, eggs, &c.

**FRICENTO**, a town and bishop's see of Italy, forty-three miles east of the city of Naples.

**FRICTION**, in mechanics, the rubbing of the parts of engines and machines against each other, by which means a great part of their effect is destroyed.

It is hardly possible to lay down general rules concerning the quantity of friction; since it depends upon a multiplicity of circumstances, as the structure, firmness, elasticity, &c. of the bodies rubbing against each other. Some authors make friction, upon an horizontal plane, equal to one third of the weight to be moved; whilst others have found it to be considerably less.

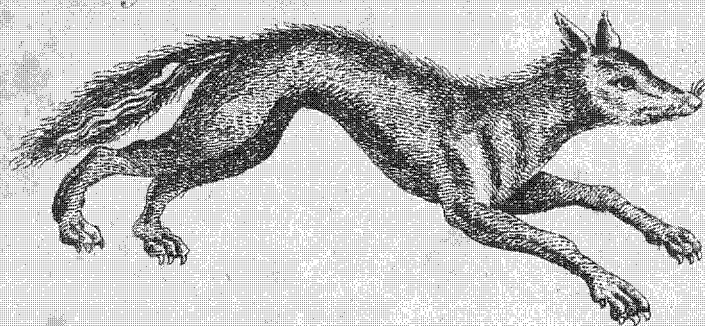
Be this as it will, the doctrine of friction, as ascertained by the latest experiments, may be summed up in the following manner. 1. When one body insists on another upon a horizontal plane, it presses it with its whole weight; which being equally re-acted on, and consequently the whole effect of its gravity destroyed by the plane, it will be absolutely free to move in any horizontal direction by any the least power applied thereto, provided both the touching surfaces be perfectly smooth. 2. But since we find no such thing as perfect smoothness in the surfaces of bodies, but an evident roughness or unevenness of the parts in their surface, arising from their porosity and peculiar texture, it is easy to understand that when two such surfaces come together, the prominent parts of one will, in some measure, fall into the concave parts of the other; and, therefore, when an horizontal motion is attempted in one, the fixed prominent parts of the other will give more or less resistance to the moving surface, by holding and detaining its parts; and this is what we call friction. 3. Now since any body will require a force proportional to its weight to draw it over a given obstacle, it follows that the friction arising to the moving body will always be in proportion to its weight only, and not the quantity of the surface, by which it bears upon the resisting plane or surface. Thus if a piece of wood four inches wide, and one thick, be laid upon another fixed piece of the same wood, it will require the same weight to draw it along, whether it be laid on its broad or narrow side. 4. For tho' there be four times the number of touching particles on the

the broad side (*ceteris paribus*) yet each particle is pressed with but  $\frac{1}{4}$  of the weight that those are on the narrow side; and since four times the number, multiplied by  $\frac{1}{4}$  of the weight, is equal to  $\frac{1}{4}$  of the number multiplied by four times the weight, it is plain the resistance is equal in both cases, and so requires the same force to overcome it. 5. The reason why friction is proportional to the weight of the moving body, is, because the power applied to move the body, must raise it over the prominent parts of the surface on which it is drawn; and this motion of the body, as it is not upright, so it will not require a power equal to its whole weight; but being in the nature of the motion on an inclined plane, it will require only a part of its own weight, which will vary with the various degrees of smoothness and asperity. 6. It is found by experiment, that a body will be drawn along by nearly one third of its weight; and if the surfaces be hard and well polished, by less than a third part; whereas, if the parts be soft or rugged, it will require a much greater weight. Thus also the cylinder of wood AB, (plate CVII. fig. 3. n<sup>o</sup> 1.) if very smooth, and laid on two well polished supporters, C, D, (having been first oiled or greased) and then charged with the weight of two pounds in the two equal balls, G, H, it will require an additional weight  $x$ , equal to about a third part of the two pounds, to give motion to, or overcome the friction of the said cylinder. 7. Now this additional weight, as it causes a greater weight of the cylinder, will likewise increase the friction, and therefore require the addition of another weight  $y$ , equal to the third part of its own weight: for the same reason, the weight  $y$  will require another  $z$ , a third part less; and so on, *ad infinitum*. Hence, supposing the friction to be precisely a third of the weight, the first weight with all the additional ones, *viz.*  $2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \&c.$  will be a series of numbers in geometrical progression, decreasing. Now the sum of all these terms, except the first, is found, by a well known theorem in arithmetic, to be equal to one pound. So that if the weight of the cylinder be inconsiderable, the readiest way to overcome the friction, would be to double the power G, or H, at once. 8. But tho' we may, at a medium, allow a third part of the weight with which any simple machine is charged, for the friction arising from thence;

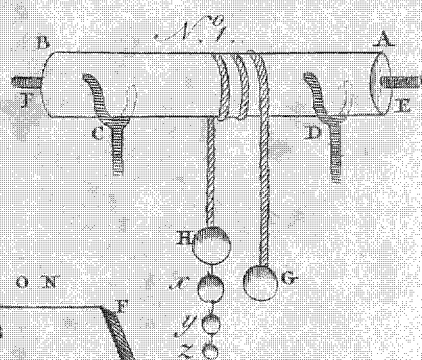
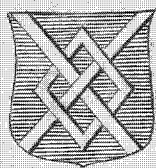
yet this is very precarious, and seldom is the case: for if ABCD (*ibid.* n<sup>o</sup> 2.) be a piece of brass of six ounces, and EFGH be also a plate of brass, and both the surfaces well ground and polished, the weight P of near two ounces will be required to draw along the body AC alone; but if AC be loaded with 6, 8, or 10 lb. then a sixth part of the weight will be sufficient to draw it along the plane. On the other hand, if the plane be covered with a linnen or woollen cloth, then a third, or half part, and sometimes more, will be requisite to draw it along on the plane. 9. Yet notwithstanding the difficulty and uncertainty attending the estimation of the quantity of friction, it is still a most useful and necessary enquiry, how, and by what means the friction of any machine may be diminished. In order to this, we must consider friction mechanically, or as a force acting against a power applied to overcome it. Thus suppose AB (*ibid.* n<sup>o</sup> 3.) an upright stem or shaft, turning freely in the socket B fixed in the table or plane IKLM; and AC, DE, two arms fixed in the said shaft, the latter of which, DE, has three pins going into a socket in the middle of heavy weights, F, G, or H, in such a manner, that when a power applied at C moves the lever AC, it causes the lever DE to protrude or thrust along the weights at F, G, or H, in a circular manner upon the table. 10. Now since we suppose the weight, all the while it is in motion, is freely and wholly supported by the plane, it follows that all the resistance it can give to the power applied to C, is only what arises from its friction on the plane. What this friction is, will be found by applying the weight at G, so that BG be equal to AC; for then the power applied to C, acting in a tangent to the circle CRS, that shall just move the weight G, will be equal to its friction. But if the weight be applied at F, because BF is greater than AC, the same power at C, as before, will not move it, by reason its force is here increased by having a greater velocity than the power; as, on the other hand, if placed at H, a less power at C shall move it, because of its having there less velocity than the power, as is evident from the properties of the lever. 11. Hence, we understand, that though the weight of a machine remains the same; yet the friction may be diminished, by contriving that the parts, on which it moves and

rubs,

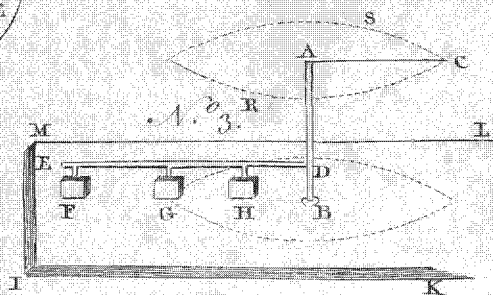
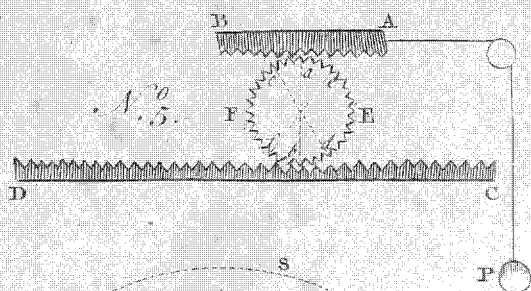
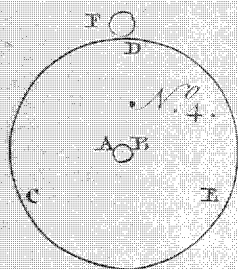
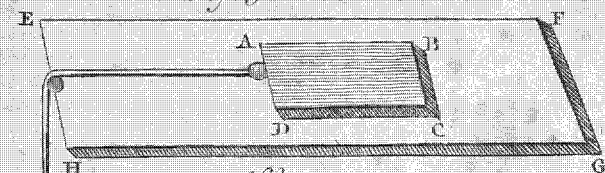
*Fig. 1. The SIBERIAN FOX.*



*Fig. 2. FRET.*



*Fig. 3. FRICTION*





rub, shall have less velocity than the power which moves it: thus, if the cylinder AB (*ibid.* n° 1.) were to move on the two small pins or gudgeons E, F, the friction would be abated in the proportion of the diameter of the cylinder to that of the pins: 12. The friction on these gudgeons is still farther diminished by causing them to move on the circumference of a wheel: thus, let F be the gudgeon of the cylinder, revolving on the wheel CDE (*ibid.* n° 4.) the velocity of the wheel's circumference will be the same with that of the gudgeon; but the velocity of the wheel's axis AB (which is now to be considered as the rubbing part) is less than that of the wheel, in proportion as its diameter is less than that of the wheel: for example, if the friction of the cylinder moving on its surface, be  $\frac{1}{3}$  part of the weight, and the gudgeon be to the cylinder as 1:10, they will reduce the friction to  $\frac{1}{30}$  part; and if, again, the axis of the wheel be to the wheel as 1:10, the wheel will reduce the friction to  $\frac{1}{300}$  part; and if the axis of this wheel be laid on the perimeter of another wheel, the friction will be reduced to a still lesser part of the weight; so that you may proceed in this manner to diminish the friction *ad infinitum*; and wheels applied in this manner, are called friction-wheels. 13. Besides what has been already said, somewhat farther is necessary to diminish the friction of wheel-carriages. It was before observed, that friction arose chiefly by lifting the body over the prominent parts of the plane on which it is moved; now if we can contrive to move the body along without lifting or sustaining its weight, we shall move it without much friction; and this may be done by laying the body on any moveable circular subject, as rollers, wheels, &c. thus let AB (*ibid.* n° 5.) be the section of an heavy body, laid on a roller EF, upon the plane CD, and drawn by the power P; it is evident, when AB moves, the asperities of its surface will lay hold on those of the roller, and move it likewise; and it is as evident, that when the body AB is drawn against the prominent parts of the roller, they immediately give way, and make no resistance: thus the perpendicular diameter *ab* yields into the situation *ef*, and *cd* succeeds in its place. By this circular motion of the roller, its prominent parts below do only descend

and move upon or over, and are not drawn against the fixed prominent parts of the plane, and so receive no resistance from them. Hence the body AB is conveyed along, without being lifted up, in the same manner as a wheel is moved by a pinion, without any considerable resistance. And this is the true foundation of the doctrine of wheel-carriages. See the article WHEEL-CARRIAGES.

**FRICTION**, in medicine, the rubbing a diseased part, either with or without unguents, oils, &c. Dr. Cheyne greatly recommends friction with a flesh-brush, to persons of weak nerves and sedentary lives; by which means a full and free perspiration would be promoted, and obstructions removed, to the great relief of many valetudinarians.

**FRIDBURG**, an imperial city of Bavaria, in Germany: east longitude 11°; and north lat. 48° 30'.

**FRIDBURG** is also the name of two other towns in Germany, both situated in the circle of upper Saxony, the one nine miles south-west of Dresden, and the other thirty miles west of Leipzig.

**FRIDLAND**, a town of Bohemia, on the confines of Lusatia: east longit. 15° 5', and north lat. 50° 55'.

**FRIDLINGEN**, a town of Swabia, in Germany: east long. 7° 30', and north lat. 47° 35'.

**FRIDSTOL**, mentioned in our ancient writers, among the immunities granted to churches, signifies a seat, chair, or place of peace and security, where criminals might find safety and protection: of these there were many in England, but the most famous was at Beverley, and that in St. Peter's church at York, granted by charter of king Henry I.

**FRIEDBURG**, an imperial city of Germany, sixteen miles north of Francfort on the Main.

**FRIENDLESS MAN**, an old saxon term for an outlaw.

**FRIER**, or **FRIAR**. See **FRIAR**.

**FRIESLAND**, one of the most northern provinces of the united Netherlands, bounded by the German ocean on the north, by Groningen and Overijssel on the east, by the Zuider-sea and Overijssel on the south, and by the same ocean on the west: its chief town is Lewarden.

**East-FRIESLAND**, a province of Westphalia, in Germany, being the north-west part of Germany, bordering on Groningen.

**FRIEZE, FREEZE, or FRIZE**, in architecture, a large flat face, or member, separating the architrave from the cornice, being that part of the entablature between the architrave and cornice. See the articles **ARCHITRAVE**, **CORNICHE**, and **ENTABLATURE**.

This member was by the antients called **zoophorus**, because it was commonly enriched with the figures of animals. The frieze is supposed to be designed to represent the heads of the transverse beams, which sustain the roof or covering.

In the tuscan order it is quite plain, but is enriched with triglyphs in the doric; it is sometimes made arched or swelling in the ionic: in the corinthian and composite it is frequently joined to the architrave by a little sweep, and sometimes to the cornice; and in these richer orders, it is commonly adorned with sculpture, figures, compartments, histories, foliages, festoons, &c. See the articles **TUSCAN**, **DORIC**, **IONIC**, &c.

As to the height of the frieze, it is in general much the same as that of the architrave. The height of the tuscan frieze, according to Vitruvius, who makes it flat and plain, is 30 minutes; but Palladio, who makes it convex and swelling, gives it only 26; Scamozzi makes it plain, but raises the height to 42 minutes. Vitruvius and Vignola, who make the doric frieze flat, only covered with triglyphs give it the height of 30 or 40 minutes: but Palladio and Scamozzi make it 45. The ionic frieze, according to Vitruvius, who makes it flat, only carved with acanthus-leaves, &c. is 30 minutes in height; Vignola makes it 45, and flat like Vitruvius: Palladio, who makes it convex and swelling, calls the height 27; and Scamozzi 28. The height of the corinthian frieze, according to Vitruvius, who enriches it with acanthus-leaves, human figures, &c. is 37 minutes; but Vignola makes it 45, Palladio, 28; and Scamozzi 31  $\frac{1}{2}$ . Lastly, the composite frieze, which, in Vitruvius, is set with cartouches, and carved between them, is, according to that writer, 52  $\frac{1}{2}$  minutes high; but Vignola, who makes it like Vitruvius, gives it but 45 minutes; Palladio, who makes it swelling, has but 30; Scamozzi, 32.

From the variety of their ornaments, friezes obtain various denominations.

**Convex or Pulvinated FRIEZES**, such whose profile is a curve, the best proportion of which is when drawn on the base of an equilateral triangle.

In some the swelling is only at top, as in a console; in others at bottom, as in a balluster. See the articles **CONSOLE** and **BALLUSTER**.

**Flourished FRIEZES**, such as are enriched with rinds of imaginary foliages, as the corinthian frieze of the frontispiece of Nero: or with natural leaves, either in clusters or garlands; or continued, as in the ionic of the gallery of Apollo in the Louvre.

**Historical FRIEZES**, such as are adorned with bas-relievos, representing history, sacrifices, &c. as the arch of Titus at Rome.

**Marine FRIEZES**, such as represent sea-horses, tritons, and other attributes of the sea, as shells, baths, grottos, &c.

**Rustic FRIEZES**, such whose courses are rusticated or embossed, as in the tuscan frieze of Palladio.

**Symbolical FRIEZES**, those adorned with the attributes of religion, as the corinthian of the temple behind the Capitol at Rome, whereon are represented the instruments and apparatus of sacrifice.

**FRIEZE of the capital**. See the article **HYPOTRACHELIUM**.

**FRIEZE, or FREEZE**, in commerce. See **FREEZE** and **FRIZING**.

**FRIGAT**, among seamen, a ship of war, light built, and that is a good sailer.

A frigate has commonly two decks, whence that called a light frigate, is a frigate with only one deck.

**FRIGATOON**, a venetian vessel, commonly used in the Adriatic sea, with a square stern, and carrying only a main-mast, mizen, and bowsprit.

**FRIGID**, is applied to a jejune style, that is unanimated by any ornaments, and consequently without any force or vigour.

**FRIGID ZONE**, in geography. See the article **ZONE**.

**FRIGORIFIC**, in physiology, small particles of matter, which, according to Gassendus and others, being actually and essentially cold, and penetrating other bodies, produce in them that quality which we call cold. See **COLD**.

**FRILL**, in falconry. When a hawk trembles, or shivers, they say, she frills.

**FRINGE TREE**, a name given by some to the chionanthus. See the article **CHIONANTHUS**.

**FRINGILLA**, in ornithology, a comprehensive genus of birds, of the order of the passerines, with the beak of a conic sharp-pointed figure, the two chaps of which mutually receive each other.

To this genus belong the gold-finch, chaff-finch, green-finch, yellow-hammer, canary-bird, linnet, sparrow, &c. See the articles GOLD-FINCH, &c.

**FRINGILLAGO**, a name given by some authors to the parus or titmouse. See the article TITMOUSE.

**FRINGILLARIUS ACCIPITER**, the name by which authors call the sparrowhawk. See the article HAWK.

**FRINWALT**, or **FRIDLAND**, a town of Brandenburg, thirty miles north-east of Berlin, situated on the west side of the river Oder.

**FRIO**, a cape or promontory of Brasil: west lon. 44°, and south lat. 23° 30'.

**FRIPPERY**, a french term sometimes used in our language to signify the trade or traffic of old second-hand cloaths and goods. The word is also used for the place where such sort of commerce is carried on, and even for the commodities themselves. The company of frippers, or fripperers, at Paris, are a regular corporation, of an ancient standing, and make a considerable figure in that city.

**FRISACH**, a town of Bavaria, sixty miles south-east of Salzburg: east lon. 14° 15', and north lat. 47° 20'.

**FRISELAND**, or **FRIESELAND**. See the article FRIESELAND.

**FRISONE**, in ornithology, the same with the coccothraustes, or loxia. See the article LOXIA.

**FRIST**, in the mercantile style, signifies selling goods upon credit, or trust.

**FRIT**, in the glass-manufacture, the matter or ingredients whereof glass is to be made, when they have been calcined or baked in a furnace; or it is the calcined matter to be run into glass. See the article GLASS.

There are three kinds of frit; the first, that made for crystal; the second, or ordinary frit, is that made for the common white or crystalline metal; and the third, that made for green glass.

The frit for crystal is made as follows: take 200 lb of tartre, powdered fine, and sifted; of the salt of polverine 130 lb; mix them well together, and put them in in the calcar, a sort of oven, or reverberatory furnace, which should be first well heated: here let them remain, baking, frying, and calcining, for five hours, during which the workman keeps mixing them with a rake, to make them incorporate. The second, or ordinary frit, is made of bare ashes of polverine, without extracting the salt from them.

The third, for green glass, is made of common ashes, without any preparation.

It may be observed, that glass might be made by immediately melting the materials, without this calcining and making them into frit; but the operation would be much more tedious.

**FRITH**, in its most usual acceptation, signifies an arm of the sea: such are the frith of Forth or of Edinburgh, the frith of Clyde, Murray frith, &c.

**FRITH**, among lawyers, signifies a lawn or plain between two woods.

**FRITH-GILD**, a term antiently used for what is now called a guild-hall, or a company of some corporation: and frithman was one free of such company. See GUILDHALL and COMPANY.

**FRITH** is also used to signify peace. Hence

**FRITH-SOKE**, or **FRITH-SOKEN**, a term formerly used to signify a surety of defence.

**FRITILLARY**, *fritillaria*, in botany, a genus of the *hexandria monogynia* class of plants, the corolla of which is composed of six campanulated, oblong, and parallel petals, with a broad base; the fruit is an oblong, obtuse, trilobate capsule, formed of three valves, and containing three cells; the seeds are numerous, plane, semicircular externally, and placed in a double row.

*Thick* **FRITILLARY**, *fritillaria crassa*, in botany, the same with the asclepias. See the article ASCLEPIAS.

**FRIULI**, a province of Italy, subject to Venice, and bounded by Carinthia in Germany on the north, by Carniola on the east, by the gulph of Venice on the south, and by the Bellunese and Feltrin on the west.

**FRIZE**, or **FRIEZE**, in architecture. See the article FRIEZE.

**FRIZE**, or **FREEZE**, in commerce. See the article FREEZE.

**FRIZING of cloth**, a term, in the woollen manufactory, applied to the forming of the nap of a cloth, or stuff, into a number of little hard burrs or prominences, covering almost the whole ground thereof. See the article FREEZE.

Some cloths are only frized on the back-side, as black cloths; others on the right side, as coloured and mixed cloths, rattsens, bays, freezes, &c.

Frizing may be performed two ways; one with the hand, that is, by means of two workmen, who conduct a kind of

plank that serves for a frizing instrument.

The other way is by a mill, worked either by water, or a horse, or sometimes by men. This latter is esteemed the better way of frizing, by reason the motion being uniform and regular, the little knobs of the frizing are formed more equably and regularly. The structure of this useful machine is as follows.

The three principal parts are the frizer or crisper, the frizing-table, and the drawer, or beam. The two first are two equal planks or boards, each about ten feet long, and fifteen inches broad, differing only in this, that the frizing-table is lined or covered with a kind of coarse woollen stuff, of a rough sturdy nap; and the frizer is incrustated with a kind of cement composed of glue, gum arabic, and a yellow sand, with a little aqua vitæ or urine. The beam, or drawer, thus called because it draws the stuff from between the frizer and the frizing-table, is a wooden roller, beset all over with little, fine, short points, or ends of wire, like those of cards used in carding of wool.

The disposition and use of the machine is thus: the table stands immoveable, and bears or sustains the cloth to be frized, which is laid with that side uppermost on which the nap is to be raised: over the table is placed the frizer, at such a distance from it as to give room for the stuff to be passed between them, so that the frizer, having a very slow semicircular motion, meeting the long hairs or naps of the cloth, twists and rolls them into little knobs or burrs, while, at the same time, the drawer, which is continually turning, draws away the stuff from under the frizer, and winds it over its own points.

All that the workman has to do while the machine is a going, is to stretch the stuff on the table, as fast as the drawer takes it off; and from time to time to take off the stuff from the points of the drawer.

The design of having the frizing-table lined with stuff of a short, stiff, stubby nap, is that it may detain the cloth between the table and the frizer long enough for the grain to be formed, that the drawer may not take it away too readily, which must otherwise be the case, as it is not held by any thing at the other end. It were unnecessary to say any thing particular of the manner of frizing stuffs

with the hand, it being the aim of the workmen to imitate, as near as they can, with their wooden instrument, the slow, equable, and circular motion of the machine: it needs only be added, that their frizer is but about two feet long and one broad; and that, to form the nap more easily, they moisten the surface of the stuff lightly, with water mingled with whites of eggs or honey.

**FROBISHER'S STRAITS**, in west Greenland, lie a little to the northward of cape Farewel: west lon. 48°, and north lat. 63°.

**FRODINGHAM**, a market-town of Yorkshire, thirty miles east of York.

**FRODSHAM**, a market-town of Chester, fourteen miles north-east of Chester.

**FROG**, *rana*, in zoology, a genus of amphibious animals, the body of which is broad and short, without a tail, and furnished with four legs.

Besides the common frog, there are a great many other species, the most singular of which is that called the bull-frog, a native of the northern parts of America, with four divided toes on the fore-feet, and five webbed ones on the hinder. This, when the limbs are extended, measures near two feet; the trunk of its body being about eight inches long, and four or five in breadth: it is very voracious, and frequently swallows young ducks, and other water-fowl, before they have strength to shift for themselves. Its croaking is so loud as to resemble the roaring of a bull heard at a distance, whence its name of bull-frog. There is also another very extraordinary species of frog, called the tree-frog, from its living on trees and plants of various kinds: also the green-frog, from its colours; its body is about an inch and a half long.

**FROG**, among farriers, the same with frush. See the article **FRUSH**.

**FROG-FISH**, the *rana piscatrix* of authors. See the article **RAWA**.

**FROME**, a market-town of Somersetshire, nine miles south of Bath.

**FRONDES**, among botanists, denote leaves consisting of several other leaves, and forming the whole of the plant; as is the case of the fern-kind, in which, the fructification being on the back of the leaves, the single leaf makes the whole plant, and is called frondis, not folium.

**FRONT of a battalion**, among military men, is the first rank, or file-leaders. It is likewise called the face or head of a battalion. In like manner



**FRONT** of a *squadron*, is the first rank of troopers.

**FRONT** of a *camp*, the foremost row of tents in the first line, which are the quarter-masters tents in the horse, and sergeants in the foot.

**FRONT** of an *army* consists of a certain number of squadrons and battalions.

**FRONT** of a *place*, or the *TENAILLE*, in fortification, all that is contained between the flanked angles of the two neighbouring bastions, *viz.* the two faces, two flanks, and the curtain.

**FRONT**, in architecture, the principal face or side of a building, or that which is presented to the chief aspect or view.

**FRONT**, in perspective, a projection or representation of the face or forepart of an object, or of that part directly opposite to the eye, which is more usually called the orthography. See *ORTHOGRAPHY*.

*Line* of the **FRONT**. See the article *LINE*.

**FRONT SCALE**. See the article *SCALE*.

**FRONTAL**, in architecture, a little fronton, or pediment, sometimes placed over a little door, or window.

**FRONTAL**, or **FRONTLET**, or **BROW-BAND**, is also used in speaking of the Jewish ceremonies.

This frontal consists of four several pieces of vellum, on each whereof is written some text of Scripture: they are all laid on a piece of calf's leather, with thongs to tie it by.

The Jews apply the leather with the vellum on their foreheads in the synagogue, and tie it round the head with the thongs.

**FRONTALE os**. See **FRONTIS os**.

**FRONTALE**, in medicine, a name for any external medicine, or topic, applied to the forehead: more particularly it means a refrigerating and hypnotic remedy, prepared of cold cephalics, bruised and tied up in a linnen bag, four or five fingers-breadth. It is sometimes used in the same sense with *anacollema*. See the article *ANACOLLEMA*.

**FRONTAL MUSCLES**, in anatomy, two of the four muscles of the cutis of the cranium. See the article *SKULL*.

The frontal muscles are very thin: they are situated under the skin of the forehead, and have both their extremities moveable, excepting only for a few fibres, which arise from the inferior edge of the *os frontis*. They are extended on each side under the eye-lids, near the larger canthus of the eye, beyond the middle of the orbit, towards the lesser canthus;

and extended somewhat obliquely outwards over the *os frontis*: after this, they expand their tendons over the upper part of the cranium, and seem to be joined with the aponeuroses of the occipitales, which are fixed. By this means they are able to move the skin of the forehead and eye-brows. The antagonists to these are the orbiculares palpebrarum, on which they are affixed. See *ORBICULARES PALPEBRARUM*.

**FRONTAL SINUS**. See *SINUS*.

**FRONTATED**, a term used by botanists relating to the leaf of a flower, which grows broader and broader, perhaps terminating in a right line: and is used in opposition to *cuspidated*, that is, when the leaves of the flower end in a point.

**FRONTEIRA**, a town of Portugal, in the province of Alentejo: west lon.  $8^{\circ} 6'$ , and north lat.  $38^{\circ} 50'$ .

**FRONTIER**, the border, confine, or extremity of a kingdom or province, which the enemies find in front, when they would enter the same: thus we say, a frontier town, a frontier province, &c. Frontiers were antiently called marches.

**FRONTIS os**, in anatomy, called also *os coronale*, the bone of the forehead. See the article *FACE*.

This is a bone of the cranium, of an irregular form, double in infants, but in adults usually single: sometimes however, it is divided in these into two parts down to the nose. It is situated in the anterior part of the skull, and forms that part of the face which is called the forehead, from whence it has its name. Its figure is symmetrical, resembling a large shell, almost round. See the article *SKULL*.

The *os frontis* is articulated, by future, to seven other bones; the *ossa parietalia*, *os ethmoides*, *os sphenoides*, *ossa lachrymalia*, *ossa nasi*, *maxillaria*, and the *ossa malarum*. See the articles *SUTURE*, *OSSA PARIETALIA*, &c.

The *os frontis* contains the anterior lobes of the brain, and a portion of the longitudinal sinus; and forms the forehead, the upper parts of the orbits, and a portion of the temples. See *BRAIN*.

In the internal surface of the *os frontis* there is a fovea, or furrow, and an eminence, to which the longitudinal sinus of the *dura mater* adheres: on its external surface are situated the frontal and temporal muscles, and the cartilaginous annule of the *musculus trochlearis* of the eye. See *MUSCULUS TROCHLEARIS*, &c.

**FRONTIGNIAC**,

**FRONTIGNIAC**, a town of Languedoc, in France, situated sixteen miles south-west of Montpellier, and remarkable for producing excellent wine.

**FRONTIGNIAC** is also the name of a fort, situated on the river St. Lawrence, in north America : west longit.  $77^{\circ}$ , and north-lat.  $43^{\circ} 20'$ .

**FRONTISPIECE**, in architecture, the portrait or principal face of a building. See the article **BUILDING**.

**FRONTISPIECE** is also used to signify an ornament fronting the title-page of a book, which, in some measure, should express the subject treated of.

**FRONTLET**, or **FRONTAL**. See the article **FRONTAL**.

**FRONTON**, in architecture, the same with pediment. See **PEDIMENT**.

**FROST**, in physiology, such an excessively cold state of the air, as converts watery fluids into ice. See the articles **FREEZING** and **ICE**.

In very cold snowy weather, not only water, but urine, beer, ale, milk, vinegar, and even wine, are either wholly or in part, converted into ice, though the last but slowly. As to the freezing of expressed oils, a very intense cold may deprive them of their fluidity, so as to be capable of being cut into portions of any figure ; but whether they are convertible into real ice, is not yet determined. In Russia oil freezes much harder than with us, but does not even there become perfect ice. Common anise-seed water, and the like weak spirits, are said to be converted into an imperfect ice in Muscovy ; and the strong spirits into a substance like that of oil. When brandy freezes, a liquid part, much stronger than common brandy, retires to the center of the vessel.

Even solid bodies are liable to be affected by frost : timber is often apparently frozen, and rendered exceedingly difficult to saw. Marble, chalk, and other less solid terrestrial concretions, will be shattered by strong and durable frosts. Metals are contracted by frost : thus, an iron-tube twelve feet long, upon being exposed to the air in a frosty night, lost two lines of its length. On the contrary, it swells or dilates fluids near one tenth of their bulk. Mr. Boyle made several experiments with metalline vessels, exceeding thick and strong ; which being filled with water, close stopped, and exposed to the cold, burst by the expansion of the frozen fluid within them. Trees are frequently burnt

up with frost, as with the most excessive heat ; and in very strong frosts, walnut-trees, ashes, and even oaks, are sometimes miserably split and cleft, so as to be seen through, and this with a terrible noise like the explosion of fire-arms.

Frost naturally proceeds from the upper parts of bodies downwards ; but how deep it will reach in earth or water, is not easily known, because this depth may vary with the degree of coldness in the air, by a longer or shorter duration of the frost, the texture of the earth, the nature of the juices wherewith it is impregnated, the constitution of its more internal parts as to heat and cold, the nature of its effluvia, &c. Mr. Boyle, in order to ascertain this depth, after four nights of hard frost, dug in an orchard, where the ground was level and bare, and found the frost had scarce reached  $3\frac{1}{2}$  inches ; and in a garden nearer the house, only 2 inches below the surface. Nine or ten successive frosty nights froze the bare ground in the garden  $6\frac{1}{2}$  inches deep ; and in the orchard, where a wall sheltered it from the south sun, to the depth of  $8\frac{1}{2}$  inches. He also dug in an orchard, near a wall, about a week afterwards, and found the frost to have penetrated to the depth of 14 inches. In a garden at Moscow, the frost in a hard season, only penetrates to 2 feet : and the utmost effect that capt. James mentions the cold to have had upon the ground of of Charleton-island, was to freeze it to 10 feet deep : whence may appear the different degrees of cold of that island and Russia. And as to the freezing of water at the above-mentioned island, the captain tells us, it does not naturally congeal above the depth of 6 feet, the rest being by accident. Water also, exposed to the cold air in large vessels, always freezes first at the upper surface, the ice gradually increasing and thickening downwards ; for which reason frogs retire in frosty weather to the bottom of ditches : and it is said, that shoals of fish retire in winter to those depths of the sea and rivers ; where they are not to be found in summer. Water, like the earth, seems not disposed to receive any very intense degree of cold at a considerable depth or distance from the air ; the vast masses of ice found in the northern seas being only many flakes and fragments, which sliding under each other, are, by the congelation of the intercepted water, cemented together.

In cold countries, the frost proves often fatal to mankind ; not only producing cancers, but even death itself. Those who die of it have their hands and feet first seized, till they grow past feeling it ; after which the rest of their bodies is so invaded, that they are taken with a drowsiness, which if indulged, they awake no more, but die insensibly. But there is another way whereby it proves mortal, *viz.* by freezing the abdomen and viscera, which on dissection are found to be mortified and black. See the article COLD.

Sharp frosts of long continuance, are very prejudicial to fish in shallow standing waters ; for if the water be deep, or there be either a current or fresh spring in the place, the fish generally escape. Ponds, therefore, should be made large and deep, at least one part of them ought to be considerably deep, to serve as a place of refuge in case of extreme cold. The symptom of mortality in a pond, is the appearance of the fish ; for nothing but the pangs of death can make them move from the bottom in frosty weather. The only effectual method to save fish in this case, is to set great tubs or fats full of water in some out-house, not far from the fire ; then making holes in the ice, the fish will gather about them, as if they came up for fresh air ; and are to be taken out and put into the tubs, where they may be kept till the frost breaks, taking care to freshen the water every twelve hours. Sometimes fish that have been dead to all appearance, and others frozen and enveloped in ice, have been preserved by putting them into water brought to midsummer heat ; for in six or seven hours the ice will be dissolved, and the fish appear as brisk and well as ever ; after which they are to be put into waters, where the frost cannot injure them.

*Hoar-Frost, pruina*, a cold moist vapour, that is drawn up a little way into the air, and in the night falls again on the earth, where it is congealed into icy crystals of various figures. Hoar-frost, therefore, is nothing but dew, turned into ice by the coldness of the air. See DEW.

**FROTH**, a white, light substance, formed on the surface of fluids, by vehement agitation, consisting of little spherules, or globules.

**FROTH-SPIT**, or **CUCKOW-SPIT**, a name given to a white froth, or spume, very common in the spring, and first months

of the summer, on the leaves of certain plants, particularly on those of the common white field lychinis, or catch-fly, thence called by some spatling poppy.

All writers on vegetables have taken notice of this froth, tho' few have understood the cause or origin of it till of late ; being formed by a little leaping animal, called by some the flea grass-hopper ; by applying its anus close to the leaf, and discharging thereon a small drop of a white viscous fluid, which containing some air in it, is soon elevated into a small bubble ; before this is well formed, it deposits such another drop, and so on, till it is every way overwhelmed with a quantity of these bubbles, which form the white froth which we see.

**FROTH**, or **FOAM**, in the manege, a moist, white matter, that arises from the mouth of a horse. A horse that, by champing on his bridle, throws out a great deal of froth, is judged to be a horse of mettle and health, and to have a cold fresh mouth.

**FROWER**, an edged tool used in cleaving wood into laths.

**FROZEN**. See the articles **FROST**, **FREEZING**, **ICE**, &c.

**FROZEN-ZONE**. See the article **ZONE**.

**FRUCTIFEROUS**, signifies properly any thing that produces fruit ; but, in a more large and figurative sense, it is used by some, particularly lord Bacon, for such experiments in natural philosophy, as prove advantageous to the experimenter in point of gain or profit.

**FRUCTIFICATION**, among botanists, in a more lax sense, includes the flower and fruit, with their several coverings. See the articles **FLOWER** and **FRUIT**.

Strictly speaking, however, the term fructification signifies only the male and female organs of generation, called the stamina and pistil. See **STAMINA**, **PISTIL**, and **GENERATION**.

**FRUCTISTS**, *fructiste*, in botany, that sort of authors who have attempted the establishing the classes and distinctions of plants upon the fruit, seed, or receptacle of these in plants. Of this list are Cæsalpinus, Morison, Ray, Herman, and Boerhaave.

**FRUGIVOROUS BIRDS**, are such as feed on fruits, either wholly or in part.

The frugivorous birds, according to Mr. Willughby, are a species of terrestrial birds, some of which have crooked bills and claws, yet are of gentler nature, and not rapacious.

**FRUIT**,

**FRUIT**, in general, includes whatever the earth produces for the nourishment and support of man, and other animals, as herbs, grain, hay, corn, &c. See the article **HERBS**, **GRAIN**, &c.

**FRUIT**, more properly, signifies the production of a tree, or plant, for the propagation or multiplication of its kind, in which sense the word takes in all kinds of seeds, with their furniture. But botanists, usually understand by it that part of a plant wherein the seeds are contained. See **PLANT** and **SEED**.

**FRUIT** also implies an assemblage of seeds in a head ; as in a ranunculus, &c. and all kinds of seeds, or grains, whether inclosed in a cover, capsule, or pod ; and whether bony, fleshy, skinny, membranous, or the like.

The fruit in all plants, is the product, or result, of the flower ; or that for the production and nutrition of which the flower was intended.

The structure and parts of different fruit differ in some things, but in all the species, the essential parts of the fruit appear to be only continuations or expansions of those which are seen in the other parts of the tree ; and the same fibres are continued to them from the root. An apple, cut in two transversely, will be found principally composed of four parts. 1. A skin, or rind, which is only a continuation and expansion of the outer bark of the tree. 2. A parenchyma, or pulp, which is an expansion and intumescence of the blea, or inner bark of the tree. 3. The fibres, or ramifications of the woody part of the tree. 4. The core, which is the produce of the pith of the wood, indurated, or strengthened by twigs of the woody fibres intermixed with it. This serves to furnish a proper lodging for the seeds, and filtrates the juices of the parenchyma, or pulp, and conveys them to the seeds.

Of the fibres there are generally reckoned fifteen branches, of which, ten penetrate the parenchyma, and incline to the basis of the flower ; the other five ascend more particularly from the pedicle, or stalk, and meet with the former at the base of the flower ; and to these branches the capsule, or coats of the kernel, are fastened. These branches, being first extended through the parenchyma to the flower, furnish the necessary matter for the vegetation of it, but as the fruit increases, it intercepts the aliment, and

by this means the flower is starved, and falls off.

In a pear, there are five parts to be distinguished ; the skin, parenchyma, ramification, stone and acetarium ; the first three parts are common to the apple : the stone, observed chiefly in choak-pears, is a congeries of stony corpuscles, which are dispersed throughout the whole parenchyma, but in the greatest plenty, and amassed closest together about the center of the acetarium. This seems formed of the stony or calculeous part of the nutritious juice.

The acetarium is a substance of a tart, acid taste, and of a globular figure, inclosed in an assemblage of several of the stony parts before-mentioned.

In plums, cherries, &c. there are four parts, *viz.* a coat, parenchyma, ramification, and stone. The outer part, or shell of the stone, seems formed of the calculeous part of the nutritious juice of the plant ; and the inner part, or kernel, of the pith of the tree, derived thither by feminal branches, which penetrate the base of the stone. The acorn consists of a shell, cortex, and medulla ; the shell consists of a coat and parenchyma, derived from the bark and wood of the tree. The cortex consists of an inner and outer part, the first of which is a duplicature of the inner trunk of the shell ; the second is a softer substance, derived from the same source as the parenchyma of the shell. But authors are not agreed whether the medulla, or pulp of the kernel, doth arise from the pith of the tree, or from the cortical part thereof.

Berries, grapes, &c. contain, besides three general parts, *viz.* coat, parenchyma, and ramification, grains of a stony nature, which are the seeds.

*Use of FRUITS.* Fruits are serviceable in guarding, preserving, and feeding the inclosed seed ; in filtrating the coarser, more earthy and strong parts of the nutritious juice of the plant, and retaining it to themselves, sending none but the most pure, elaborated and spirituous parts to the seed, for the support and growth of the tender delicate embryo, or plantule, therein contained.

The use of fruits, with us, might be rendered much more extensive than it is. Many fruits, which do hurt when eaten raw, would make wines equal in flavour to many of those now obtained at great prices from abroad ; and lands which

will

will not bear corn, yet would bear trees and shrubs, producing such fruits.

Cherries, properly managed, make an excellent wine, and that in very large quantities, and plums also make a very agreeable kind; but that it has an austereness, which must be taken off by mixing a little sugar with it, when in the glass, not before it is drawn off. A coarse plum, a little larger than a damson, is the best kind for this wine, being a sort of plum that grows wild in our hedges. The wine made from it is of a very considerable strength, and affords a pleasant brandy, by distillation, in considerable quantities. Our common garden currants, afford a very agreeable wine; and our gooseberries are not second to any thing. See the articles **BRANDY, WINE, &c.**

The various uses of different fruits in the materia medica, &c. may be seen in the course of this work, each under its proper head.

**Preservation of FRUIT.** In the Philosophical Transactions, n° 237, we have a receipt for preserving fruit and flowers for a whole year, which is as follows. Take salt petre, one pound; bole armoniac, two pounds; common clean sand three pounds: mix them together; and, in dry weather, take fruit or flowers of any sort, not fully ripe, each with its stalk, and put them singly into an open glass, till it be full; cover it close with oil cloth; and in a dry cellar, put each of these glasses four fingers-deep under ground, so that quite round above, as well as below, there may remain two fingers-thick of the mixture.

To preserve quinces, apples, &c. lord Bacon directs us to plunge them in honey; but as that may give them an over luscious taste, to dip them in syrup of wine, boiled to a due height. The conservation of fruit, continues that author, should be tried in vessels filled with fine sand, or powder of chalk; or in flower, the dust of oakwood, &c. Fruits intended for long keeping, he says, should be gathered before they are full ripe, and in a fair day, towards noon, the wind not blowing south, and the moon being under the horizon, and in her decrease.

**First FRUITS.** See **FIRST FRUITS.**

**FRUIT-TREES.** With regard to fruit-trees it may be observed, 1. That the cutting and pruning them, when young, prevent their bearing, though it contributes

to the richness and flavour of the fruit, as well as to the beauty of the tree. 2. That kernel fruit trees come later to bear than stone fruit-trees; the time required by the first before they come to any fit age for bearing, being one with another five years; but when they do begin, they bear in greater plenty than stone-fruit. 3. That stone-fruit, figs, and grapes, commonly bear considerably in three or four years; and bear full crops the fifth and sixth years; and hold it for many years, if well ordered. 4.

That fruit trees in the same neighbourhood will ripen a fortnight sooner in some grounds than in others of a different temperature. 5. That in the same country hot or cold summers set considerably forwards, or put backwards the same fruit. 6. That the fruit on wall-trees generally ripen before those on standards, and those on standards before those on dwarfs.

7. That the fruit of all wall trees planted in the south and east quarters, commonly ripen about the same time, only those in the south rather earlier than those in the east; those in the west are later by eight or ten days, and those in the north, by fifteen or twenty. For the planting, pruning, grafting, &c. of fruit-trees. See the articles **PLANTING, TRANSPLANTING, PRUNING, GRAFTING, ORCHARD, GARDEN, NURSERY, &c.**

**FRUITERY**, a place for the keeping of fruit, a fruit-house, or fruit-loft.

A fruitery should be inaccessible to any thing of moisture, and should be as much as possible so, even to frost.

**FRUITFULNESS**, the quality of bearing plenty of fruit. See **FRUIT.**

**FRUMENTACEOUS**, a term applied, by botanists, to all such plants as have a conformity with wheat, in respect of their fruits, leaves, ears, or the like.

**FRUMENTARII**, a kind of soldiers, or archers, under the western empire.

The first time we read of these officers is in the time of the emperor Adrian, who made use of them to inform himself of whatever passed. They did not make any particular corps distinct from the rest of the forces, but there was a certain number of them in each legion. It is supposed that they were at first a number of young persons disposed, by Augustus, throughout the provinces, particularly on all the grand roads, to acquaint the emperor, with all expedition, of every thing that happened.

Afterwards they were incorporated into the troops themselves, where they still retained their antient name. As their principal office was the giving intelligence, they were often joined with the curiosi, with whom they agreed in this part of their office. See *CURIOSUS*.

Their name of *frumentarii* is derived from their being also a sort of purveyors to the armies, cities, &c. collecting all the corn from the several provinces to furnish the common-wealth.

**FRUMENTATION**, in roman antiquity, a largess of corn bestowed on the people.

This practice of giving corn to the people was very antient among the Romans; and frequently used to sooth the turbulent humour of the populace. At first the number of those to whom this largess was given, was indeterminate, till Augustus fixed it at two hundred thousand.

**FRUMENTUM SARACENICUM**, in botany, the same with the *fagopyrum*. See the article *FAGOPYRUM*.

**FRUMENTUM INDICUM**, the same with maiz, or indian corn. See *MAIZ*.

**FRUMENTY**, or *FURMETY*, a kind of pottage, made up of wheat, milk, sugar, spice, &c.

**FRUMGYLD**, in old law books, signifies the first payment made to the kindred of a person slain, by way of recompence for his murder.

**FRUMSTOL**, a term antiently used for a mansion-house.

**FRUSH**, or *FROG*, among farriers, a sort of tender horn which arises in the middle of a horse's sole; and, at some distance from the toe, divides into two branches, running towards the heel in the form of a fork.

The frush is a part of a horse's foot, the top of which only should be pared, and that every time the foot is pared, otherwise it is apt to corrupt.

**FRUSTIUM**, in mathematics, a part of some solid body separated from the rest.

The frustum of a cone is the part that remains; when the top is cut off by a plane parallel to the base; and is otherwise called a truncated cone; for finding the surface and solidity of which, see the article *CONE*.

The frustum of a pyramid is also what remains after the top is cut off by a plane parallel to its base, the mensuration of which will be found under the article *PYRAMID*.

The frustum of a globe or sphere is any part thereof cut off by a plane, the solid contents of which may be found by this rule. To three times the square of the semidiameter of the base, add the square of its height; then multiplying that sum by the height, and this product multiplied by .5236 gives the solidity of the frustum. See the article *SPHERE*.

A frustum or portion of any solid, generated by the revolution of any conic section upon its axis, and terminated by any two parallel planes, may be thus compared to a cylinder of the same altitude, and whose base is equal to the middle section of the frustum made by a parallel plane. 1. The difference between such frustum and cylinder is always the same in different parts of the same or of similar solids; when the inclination of the planes to the axis, and the altitude of the frustum are given.

2. In the parabolic conoid, this difference vanishes; the frustum being always equal to a cylinder of the same height, upon the section of the conoid that bisects the altitude of the frustum, and is parallel to its bases. 3. In the sphere, the frustum is always less than the cylinder, by one fourth part of a right-angled cone of the same height with the frustum; or, by one half of a sphere, of a diameter equal to that height; and this difference is always the same in all spheres whatever, when the altitude of the frustum is given.

4. In the cone, the frustum always exceeds the cylinder, by one fourth part of the content of a similar cone, that has the same height with the frustum. See *Mac Laurin's Fluxions*, p. 24. where he likewise compares the frustums of the hyperbolic conoid and spheroid with a cylinder. See also *GAUGING*.

**FRUTEX**, among botanists, denotes a shrub. See the article *SHRUB*.

**FRUTEX ÆTHIOPICUS** and **AFRICANUS**, a name given to several species of pine. See the article *PINE*.

**FRUTICOSE STALKS**, among botanists, those with a hard woody substance. See the article *STALK*.

**FRY**, in zoology, signifies the spawn, or rather young, of fish. See *FISH*.

**FRYTH**, or *FRITH*, in old law books. See the article *FRITH*.

**FUAGE**, in old writers, a tax of 12d. for every fire, levied in the time of Edw. III.

**FUCA**, or **PHUCA**, in ichthyology, a genus of fishes, called by Artdi phycis. See the article **PHYCIS**.

**FUCHSIA**, in botany, a genus of plants, the characters of which are not perfectly ascertained. The flower consists of a single petal, the tube is elevated; the limb is divided into eight segments, and plane; the segments are acuminate, and alternately lower; the fruit is a roundish berry, marked with four furrows, and containing four cells: the seeds are numerous, oval, and placed in a double series.

**FUCUS**, in botany, a genus of submarine plants, belonging to the *cryptogamia* class of Linnæus.

The fucus consists of a tough matter, formed into a kind of leaves, which are flat and variously divaricated; and which have some appearance of fructification, in punctated tubercles, covering oblong vesicles, supposed by Linnæus to be male flowers; and smooth, roundish vesicles, hollow and interwoven with filaments, which appear to him to be female flowers.

There are a great many species of fucus with broader or narrower leaves, and other peculiarities; one of which, the broad-leaved, ferrated fucus, grows to the height of six, eight, or more inches.

**FUDDER**, or **FODDER**, among miners. See the article **FODDER**.

**FUEL**, whatever is proper to burn or make a fire; as, 1. Wood, which should be so felled that cattle may have the browsing of it; for in winter they will not only eat the tender twigs, but even the very moss. The underwood is usually felled for fuel; but if the head or top be used for firing, it is best to begin three or four feet above the timber, if considerable. 2. Fossile and bituminous earths, as turfs and peats. 3. Sulphureous fossils of a firmer texture, as the common coals, Scotch coals, cannel-coal, &c.

It is provided by statute, that wood-fuel shall not be felled under the assize, viz. a faggot bound is to be three feet in length, and have the bond twenty-four inches round, besides the knot. Billets also are to be of a certain length, on certain penalties. See the article **BILLET**.

The fuel, in chemical operations, must be chosen suitable to the intention. The natural sun, in summer, suffices for insulations. A spirit-lamp may be made to give a moderate, or a considerably strong heat, according to the number of

wicks employed. The lighter fuels, such as straw, leaves, twigs, &c. come next in order, after spirit of wine; then oils, wax, rosin, pitch, and, lastly, solid wood, coals, and turf: all which may have their proper furnaces, so as to be burnt in the requisite quantity, and with requisite fierceness or slowness. To excite the greatest degree of heat, the rule is to use the densest fuel in large quantities, which must be blown incessantly with bellows all round the fire wherein the matter to be acted on is lodged.

**FUENTE DUENA**, a town of New-Castile, in Spain, 35 miles south-east of Madrid.

**FUGA VACUI** in the antient schools of philosophy, a supposed aversion in nature to a vacuum. See **VACUUM**.

**FUGALIA**, in roman antiquity, a feast supposed by some to be the same with the regifugium, held on the 24th of February, in memory of the expulsion of the kings, and the abolishing of the monarchical government. Others again, distinguish the fugalia from the regifuge. And others think, that the fugalia was the same with the poplifugia; or the feast of fugia, the goddess of joy, occasioned by the rout of an enemy, which was the reason the people abandoned themselves to riot and debauchery. See **REGIFUGE** and **POPLIFUGIA**.

**FUGAM FECIT**, in law, is when it is found by inquisition that a person fled for felony, &c.

If flight and felony be found on an indictment for felony, or before the coroner, where the murder is committed, the offender shall forfeit all his goods, and the issues of his lands, till he is acquitted or pardoned: and upon finding before justices of oyer, &c. that the offender fled, though he be acquitted on his trial, he forfeits his goods.

**FUGITIVE**, a person obliged to fly his country, or remove from a place where he had some abode, or establishment, on account of his crimes, debts, or other occasions.

**FUGITIVE'S GOODS**, the proper goods of the person that flies on a felony committed by him, which, after the flight, is lawfully found to belong to the king, or lord of the manor.

**FUGITIVES OVER SEA**, persons that go over sea without the king's license, who, unless they are merchants, or eminent persons, forfeit all their goods.

**FUGUE**, in muſic, is when different parts of a muſical compoſition follow each other ; each repeating what the firſt had performed.

There are three kinds of fugues ; the ſimple, double, and counter.

*Single*, or *Simple FUGUE*, is ſome point conſiſting of four, five, or more notes, begun by one ſimple part, and ſeconded by a ſecond, third, fourth, fifth, &c. if the compoſition conſiſt of ſo many ; repeating the ſame, or ſuch like, notes ; (*i. e.* in the ſame proportion) ſo that the ſeveral parts follow, or come in one after another, in the ſame manner ; the leading part ſtill flying before thoſe that follow.

**FUGUE DOUBLE**, or **FUGA DOPPIA**, is when two or more different points move together in a fugue, and are alternately mixed and interchanged by the ſeveral parts. See the article **PART**.

*Counter FUGUE*. See the article **COUNTER**.

**FULCRUM**, in mechanics, the prop or ſupport, by which a lever is ſuſtained. See the article **LEVER**.

**FULD**, a town and abbey of Germany, the abbot of which is a prince of the empire : eaſt long.  $9^{\circ} 35'$ , north lat.  $50^{\circ} 14'$ .

**FULICA**, the **COOT**, in ornithology, a genus of birds, of the order of the gallinæ, with a naked or bald forehead, and divided or cloyen feet : add to this, that all the toes are longer than in whole-footed birds, and have ſemi-circular membranes affixed to their joints.

Of this bird, authors mention ſeveral ſpecies, all diſtinguiſhed by their cloyen toes, and a fleſhy excrescence bare of feathers, and reaching from the bill almoſt to the crown of the head.

**FULIGINOUS**, whatever proceeds from a thick, ſooty ſmoke, ſuch as litharge and lamp-black.

**FULIGNO**, a city of Italy, in the pope's territories, ten miles north of Spoletto.

**FULIGO**, in natural hiſtory, a ſpecies of pumice-ſtone. See **PUMICE**.

**FULIGULA**, in ornithology, the name by which authors call the tuſted duck, with a hanging creſt, a black body, and white belly, and a white ſpot on the wings. It is about the ſize of the common duck.

**FULL-MOON**, *plenilunium*, that phaſis of the moon when, in her oppoſition to the ſun, the whole of her diſc is illuminated ; in which time eclipses of the moon can only happen. See the articles **MOON** and **ECLIPSE**.

**FULLER**, a workman employed in the woolen manufactories, to mill, or ſcour, cloths, ſerges, and other ſtuſs, in order to render them more thick, compact, and durable. See the article **CLOTH**.

Fullers, in conformity to the regulations of the manuſactuſers in France, are obliged to mark their ſtuſs with a particular lead after fulling. They are forbid, by the ſame regulations, to draw out, or tenter-ſtretch, their manuſactuſes, that they may be made greater in length, and narrower in breadth, &c.

**FULLER'S EARTH**, *terra fullonica*, in natural hiſtory, a ſoft, greyiſh, brown, denſe, and heavy marle : when dry, it is of a greyiſh, aſh-coloured brown, in all degrees from very pale to almoſt black, and it has generally ſomething of a greeniſh caſt : it is very hard and firm, of a compact texture, of a rough and ſomewhat duſty ſurface, that adheres ſlightly to the tongue : it is very ſoft to the touch, not ſtaining the hands, nor breaking eaſily between the fingers : it has a little harſhneſs between the teeth, and melts freely in the mouth : thrown into water, it makes no ebullition, or hiſſing, but ſwells gradually in bulk, and falls into a fine ſoft powder. It makes no efferveſcence with aqua fortis.

It is of great uſe in ſcouring cloths, ſtuſs, &c. imbibing all the greaſe and oil uſed in preparing, dreſſing, &c. of the wool, for which reaſon it is made a contraband commodity, and is not to be exported under the penalty of 1s. for every pound weight. See **FULLING**.

**FULLER'S WEED**, in botany, a name ſometimes given to the diſpacus, or teaſel. See the article **DIPSACUS**.

**FULLERY**, a place where cloths, &c. are fullied. See the next article.

**FULLING**, the art or act of ſcouring and preſſing cloths, ſtuſs, ſtockings, &c. to cleanſe, thicken, and render them more firm and ſtrong, which is done by means of a water-mill.

For the deſcription of this mill, ſee plate CVIII. fig. 1. in which, 1. is the track of the wheel, that turns on the outſide ; 2. a front view of the wheel ; 3. the arbour with its leavers, which as they paſs, raiſe the heads of the wooden mallets, and let them fall alternately ; 4. the trough, which in the plate is hid behind the timber work, and is only expreſſed by dots that ſhew its poſition : each trough has at leaſt two, and ſometimes three mallets ; 5. the head of the mallet,



mallet, with three or four notches, which hinder the stuff from sticking under the hammer ; 6. the arm or handle ; 7. the end of the mallet fastened by a pin. 8. In the troughs are laid the cloths, stuffs, &c. intended to be fulled : then letting the current of water fall on the wheel, the mallets are successively let fall upon them, when by their weight and velocity they stamp and press the stuffs very strongly, which by this means become thickened and condensed.

In this operation, fuller's earth is used with some proportion of soap ; but soap alone would do much better, was it not dearer than fuller's earth.

Fulling of stockings, caps, &c. is performed either with the hands or feet, or a kind of wooden machine, either armed with wooden teeth, or those of horses or bullocks. The ingredients generally used on this occasion are fuller's earth, urine, white soap and green soap. But water softened with chalk is far preferable.

The following is M. Colmet's method of fulling with soap, grounded on experiments made by order of the *marquis de Louvois*. Let a coloured cloth of about 45 ells, be laid in the usual manner in the trough of a fulling-mill, without first soaking it in water, as commonly practised in most places. To full this troughful of cloth, fifteen pounds of soap are required, one half of which is to be melted in two pails of river or spring water, made as hot as the hand can bear. Let this solution be poured by little and little, upon the cloth, in proportion as it is laid in the trough : thus it is to be fulled for at least two hours ; after which, let it be taken out and stretched. This done, let the cloth be immediately returned into the same trough, without fresh soap, and there fulled two hours more. Then take it out, wring it well, and express all the grease and filth. After the second fulling, dissolve the remainder of the soap, as the former part, and throw it at four several times on the cloth, not forgetting to take it out every two hours, to undo the plaits and wrinkles it got in the trough. When it is sufficiently fulled, and brought to the requisite quality and thickness, it is scoured out for good in hot water, keeping it in the trough till it be thoroughly clean. As white cloths full more easily than coloured ones, a third part of the soap may be spared.

FULLO, in ichthyology, a name used by several authors for the tench.

FULMINATING, something that thunders, or resembles thunder. See the article THUNDER.

Naturalists speak of fulminating gold, fulminating powder, &c. See the articles AURUM, PULVIS, &c.

FULMINATING LEGION, in antiquity. See the article THUNDERING LEGION.

FULMINATION, in chemistry, is used in a synonymous sense with detonation. See the article DETONATION.

Fulmination in the depuration of the more perfect metals, is, when upon infusing them with lead, a brighter colour succeeds a kind of sulphureous cloud, before appearing in the metals, during the fusion.

FULMINATION, in the romish canon-law, a sentence of a bishop, official, or other ecclesiastic appointed by the pope, by which it is decreed, that some bull sent from the pope shall be executed.

FULMINATION is also used for the denunciation, or execution of a sentence of anathema, made public with due solemnity. See ANATHEMA.

FUMARIA, in botany, a genus of the *diadelphia hexandria* class of plants, with a polypetalous anomalous flower, the petals of which are oblong and tubulated : the fruit is a small unilocular pod, containing a number of roundish seeds.

This genus comprehends the fumitory, bastard-fumitory, capnoides, cysticapnos, cucularia, corydalis, and capnorchis of authors ; some with a roundish, others with an ovato-acuminated, and others with a very long pod.

The whole plant of fumitory is used in medicine, being accounted good in the scurvy, jaundice, and disorders of the mesentery and spleen.

FUME, in medicine. See FUMIGATION.

FUMER, in zoology, a name sometimes given to the putorius, or pole-cat.

FUMET, a term used by sportsmen for the ordure, or dung, of harts.

FUMIGATION, in chemistry, a kind of calcination, when metals, or other hard bodies, are corroded, or softened, by receiving certain fumes for that purpose.

FUMIGATION, in medicine, the application of fumes to particular parts of the body ; as those of fastitious cinnabar, to venereal ulcers. See the article ULCER.

An hystheric fume is made of an ounce of *assa foetida*, and a pound of the best white-wine vinegar, boiled in a pot with a narrow mouth, to which the patient should hold her head, with her mouth open. Steams received this way up the nose, have very sudden and remarkable effects, but this application seems justifiable only in cases where other means cannot be used. See **HYSTERIC**.

A fumigation for a catarrh is made by taking *olibanum*, amber, benjamin, gum guaiacum, and balsam of Tolu, of each two scruples : and making them all into a gross powder to burn.

Where the defluxion is very thin, and has much of its cause in the laxity of the glands, such means may do service, by constringing the parts, and repelling the flux ; but where there is an asthma, and very weak lungs, it may be very inconvenient. See the article **CATARRH**.

To make a fumigation against the falling down of the anus, or fundament. Take frankincense, mastic, amber, and cloves, of each a dram ; red rose-leaves, balaustines, of each two drams ; make them into a gross powder.

This is to be burnt upon a chaffing-dish of coals, under a chair, with a hole in it ; over which the patient is to sit with the bare part to it, after the gut is thrust up ; and by such means continued, will the sphincter at last get strength enough to keep it up, without any such help. In a teneismus it is also of use. See the article **PROLAPSUS**.

A fumigation against the falling down of the womb is made by taking myrrh, mastic, cinnamon, and spikenard, of each a dram ; mint and red roses of each two drams ; cloves, zedoary, and pimento of each half a dram. Make all into a powder to burn.

This is to be used as the preceding ; and in the same weakness it is also good, as that is of service in this.

Fumes from hot aromatic liquors, which are sometimes directed to the same purposes, are hardly so efficacious as those which arise from the burning of dry ingredients, because their moisture prevents their being so immediately restraining.

**FUMITOKY**, *Junaria*, in botany. See **FUMARIA**.

**FUNAMBULI**, in antiquity, rope dancers. See the article **DANCE**.

**FUNCHAL**, the capital of the Madeira-islands, subject to Portugal : west long. 16°, north lat. 32° 33'.

**FUNCTION**, the act of fulfilling the duties of any employment.

Function, being also applied to the actions of the body, is by physicians divided into vital, animal, and natural. The vital functions are those necessary to life, and without which, the individual cannot subsist ; as the motion of the heart, lungs, &c. The natural functions are such as it cannot subsist any considerable time without them, as the digestion of the aliment, and its conversion into blood. Under animal functions are included the senses of touching, tasting, &c. memory, judgment, and voluntary motion, without any, or all of which an animal may live, but not very comfortably.

The animal functions perform the motion of the body by the action of the muscles, and this action consists chiefly in the shortening the fleshy fibres, which is called contraction, the principal agents of which, are the arteries and nerves distributed in the fleshy fibres. See the articles **ARTERY** and **NERVE**.

In short, all parts of the body have their own functions, or actions peculiar to themselves. Life consists in the exercise of these functions, and health in the free and ready exercise of them.

**FUNCTION**, in algebra, denotes any compound quantity ; and when one of the component quantities is variable, it is said to be a variable function. See the article **QUANTITY**.

Functions are formed either by addition, subtraction, multiplication, division, involution, or evolution ; as also by the resolution of equations. But besides these, which are called algebraical functions, there are others called transcendental, arising from the management of exponents, logarithms, &c.

For a farther account of functions, the reader may consult Bernoulli, *Oper. T. 3.* also Euler's *Analys. Infinitor.*

**FUND**, in anatomy, signifies the bottom of any cavity in the body ; thus, the fund of the eye is that part possessed by the choroides and retina ; the fund of the uterus, the fund of the bladder, &c. signify also the bottom of these parts. See the articles **EYE** and **UTERUS**.

**FUND**, in commerce, signifies the stocks of the great trading and monied companies. See the article **STOCKS**.

**FUNDS** is also a term adopted by those who speak of the public revenue of nations, to signify the several taxes that have been laid upon merchandizes either by way

of duties of custom, or excise, or in any other manner, to supply the exigencies of the state, and to pay interest for what sums it may have occasion to borrow. Thus we say, such a duty, or such a tax, is a good fund to answer such a purpose.

The funds or taxes of this kingdom, are either temporary or perpetual: temporary ones, are such as are either imposed for a certain number of years, or annually, as the land and malt-taxes: the perpetual funds, are such on which money has been borrowed for the public service, and which are appropriated for the secure and certain payment of the interest of such money, till the discharge of the principal so borrowed. See the articles **DUTY, CUSTOM, TAX, &c.**

**FUNDAMENT**, in anatomy, the same with anus. See the article **ANUS**.

**FUNDAMENTAL**, in general, something that serves as a base or foundation to another.

**FUNDAMENTAL NOTE**, in music, the principal note in a song, or composition, to which all the rest are in some measure adapted, and by which they are swayed: it is otherwise called the key to the song, See the articles **KEY** and **CLEF**.

**FUNDAMENTO**, in the italian music, every part that plays or sings the bass; but more especially the thorough bass, as being the foundation of all harmony.

**FUNDI-BAY**, that situated between New England and New Scotland, in which there is said to be an excellent fishery.

**FUNDULUS**, in ichthyology, a fish otherwise called cobitis. See **COBITIS**.

**FUNDULUS** is also used by Charlton for the gudgeon. See the article **GUDGEON**.

**FUNEN**, the second island for magnitude belonging to the king of Denmark, situated at the entrance of the Baltic sea, and separated from Jutland by the strait called the lesser Belt, and from the island of Zeland by the strait called the great Belt. Its chief town is Odensee.

**FUNERAL RITES**, ceremonies accompanying the interment or burial of any person. See the article **BURIAL**.

These rites differed among the antients according to the different genius and religion of each country. The Egyptians, among the rest of their funeral rites, embalmed their dead. See **EMBALMING**.

Among the ancient Greeks it was usual sometimes, before the interment, to put a piece of money into the mouth of the deceased, which was thought to be Cha-

ron's fare for waiving the departed soul over the infernal river. This ceremony was not used in those countries which were supposed to be situated in the neighbourhood of the infernal regions, and to lead thither by a ready and direct road. The corpse was likewise furnished with a cake, composed of flour, honey, &c. which was designed to appease the fury of Cerberus, the door keeper of hell, and to procure the ghost a safe and quiet entrance.

During the time the corpse continued in the house, there stood before the door a vessel of water, the design of which was, that those concerned about the body, might purify themselves by washing; it being the opinion of the Greeks, as well as of the Jews, that pollution was contracted by touching a dead body.

The ceremonies by which they expressed their sorrow for the death of their friends, were various; but it seems to have been a constant rule to recede as much as possible in habit and behaviour from their ordinary customs. For this reason they abstained from banquets and entertainments; they divested themselves of all ornaments; they tore, cut off, or shaved their hair, which they cast into the funeral pile, to be consumed with the body of their deceased friend. Sometimes they threw themselves on the ground, and rolled in the dust, or covered their head with ashes; they beat their breasts, and even tore their flesh with their nails, upon the loss of a person they much lamented. When persons of rank, such as public magistrates, or great generals, died, the whole city put on a face of mourning: all public meetings were intermitted; the schools, baths, shops, temples, and all places of concourse, were shut up. See the article **MOURNING**. Interring or laying the dead in the ground, seems to have been the most ancient practice among the Greeks; tho' burning came afterwards to be generally used among them. It was customary to throw into the funeral pile those garments the deceased usually wore. The pile was lighted by one of the dead person's nearest relations or friends, who made prayers and vows to the winds to assist the flames, that the body might quickly be reduced to ashes; and during the time the pile was burning, the dead person's friends stood by it, pouring libations of wine, and calling upon the deceased. See the article **BURNING**.

When

When Numa reformed the religion of Rome, he ordered that the pontiffs should have the care of the funeral ceremonies ; which, in most respects, were like those of the Greeks already described.

The funeral rites among the Hebrews, were solemn and magnificent : when any person was dead, his relations and friends rent their cloaths ; which custom is but faintly imitated by the modern Jews, who only cut off a bit of their garment, in token of affliction. It was usual to bend the dead person's thumb into the hand, and fasten it in that posture with a string ; because the thumb then having the figure of the name of God, they thought the devil would not dare to approach it. When they came to the burying place, they made a speech to the dead in the following terms : " Blessed " be God, who has formed thee, fed " thee, maintained thee, and taken away " thy life. O dead ! he knows your " numbers, and shall one day restore " your life, &c." Then they spoke the elogium, or funeral oration, of the deceased ; after which they said a prayer, called the righteousness of judgment ; then turning the face of the deceased towards heaven, they called out, " Go in " peace."

The antient christians testified their abhorrence of the pagan custom of burning the dead ; and always deposited the body entire in the ground : and it was usual to bestow the honour of embalming upon the martyrs, at least, if not upon others. They prepared the body for burial, by washing it with water, and dressing it in a funeral attire. The exportation, or carrying forth of the body, was performed by near relations, or persons of such dignity as the circumstances of the deceased required. Psalmody, or singing of psalms, was the great ceremony used in all funeral processions among the antient christians.

In the romish church, when a person is dead, they wash the body, and put a crucifix in its hand. At its feet stands a vessel full of holy-water, and a sprinkler, that they who come in may sprinkle both themselves and the deceased. In the mean time some priest stands by the corpse, and prays for the deceased till it is laid in the earth. In the funeral procession, the exorcist walks first, carrying the holy water ; next the cross-bearer, afterwards the rest of the clergy, and last of all the officiating priest. They all sing the *mise-*

*re*, and some other psalms ; and at the end of each psalm a *requiem*. We learn from Alet's ritual, that the faces of deceased laymen must be turned towards the altar, when they are placed in the church ; and those of the clergy, towards the people. The corpse is placed in the church surrounded with lighted tapers : after the office for the dead, mals is said ; then the officiating priest sprinkles the corpse thrice with holy water, and as often throws incense on it. The body being laid in the grave, the friends and relations of the deceased sprinkle the grave with holy water.

The funeral ceremonies of the greek church, are much the same with those of the latin. It needs only be observed, that after the funeral service, they kiss the crucifix, and salute the mouth and forehead of the deceased : after which each of the company eats a bit of bread, and drinks a glass of wine in the church, wishing the soul a good repose, and the afflicted family all consolation.

**FUNERAL COLUMN**, a column crowned with an urn, wherein the ashes of some deceased person are supposed to be enclosed ; the staff or shaft being beset with tears or flames, the symbols of grief and immortality. See **COLUMN**.

**FUNERAL GAMES**, a part of the ceremony of the antient funerals.

It was customary for persons of quality, among the antient Greeks and Romans, to institute games with all sorts of exercises, to render the death of their friends more remarkable. This practice was generally received, and is frequently mentioned by antient writers. Patroclus's funeral games, take up the greatest part of one of Homer's iliads ; and Agamemnon's ghost is introduced by the same poet in Odyss. *æ*, telling the ghost of Achilles, that he had been a spectator at a great number of such solemnities.

The celebration of these games among the Greeks, mostly consisted of horse-races : the prizes were of different sorts and value, according to the quality and magnificence of the person that celebrated them. The garlands, given to victors on this occasion, were usually of parsley, which was thought to have some particular relation to the dead.

Those games, among the Romans, consisted chiefly of processions ; and sometimes of mortal combats of gladiators, around the funeral pile. They, as well as the Greeks, had also a custom, tho' very

very antient, of cutting the throats of a number of captives before the pile, as victims to appease the manes of the deceased. Cæsar relates, that the Gauls had this custom.

The funeral games were abolished by the emperor Claudius.

**FUNERAL HONOURS.** See **HONOUR.**

**FUNERAL ORATION**, a discourse pronounced in praise of a person deceased, at the ceremony of his funeral.

This custom is very antient, both among the Greeks and Romans. Before the company departed from the sepulchre, they were often entertained with a panegyric upon the dead person, always pronounced by a near relation, or one of the public magistrates.

**FUNGITÆ**, in natural history, a kind of fossil coral, of a conic figure, tho' sometimes flattened and striated longitudinally. See the article **CORAL.**

**FUNGUS**, in surgery, denotes any spongy excrescence. See **EXCRESCENCE.**

In wounds made by a sharp instrument, where there is no disposition of body, the cure is generally performed without any interruption, but from the fungus; and here dry lint alone is generally the best remedy through the whole course of dressing. See **ULCER** and **WOUND.** If ulcers produce a spongy lax flesh, sprouting very high above the surface, it will be necessary to destroy it by some of the escharotics, or the knife. This fungus frequently approaches to a cancerous complexion, and when it rises upon some glands, sometimes actually degenerates into a cancer, as has happened in buboes of the groin. When excrescences have arisen in venereal ulcers, escharotics are to be preferred, and pulvis angelicus, which is a composition of precipitate powder and burnt alum, as it eats deeper, is preferable to precipitate alone. When the excrescence is cancerous, and does not arise from a large cancer, but only from the skin itself, the actual cautery is usually recommended; tho' it is a more secure method to cut away quite underneath, and afterwards to dress with easy applications; but the cases where either of these methods are practicable, very rarely occur.

A fungus in the joints, is a tumour in the articulations of the limbs, without heat or pain, and so soft, that it easily yields to the pressure of the finger; but upon its removal, expands itself immediately, without retaining any marks.

This may be distinguished from the dropsy of the joint, if it be observed that the latter is a distention of the entire joint, and the other arises rather on one side.

The most proper method of cure, is to rub the part affected several times a-day with warm cloths, and then to foment it with the following decoction: take of litharge, half a pound; armenian bole, an ounce; mastich and myrrh, each half an ounce; wine vinegar, a pint: boil these together for a quarter of an hour. Use this decoction warm. See the article **FOMENTATION.**

If none of these medicines answer the purpose, an incision must be made into the tumefied joint, towards the lower and most commodious part, pressing the tumour hard with your fingers, and retaining it with a bandage placed above it, to prevent its giving way. When the member is restored to its pristine form, it may be healed by vulnerary balsams; but to prevent the serum from collecting again, purging and sudorific medicines should be given, and the wound be kept open with tents for some time. See **WOUND.**

**FUNGUS**, in botany, an order of vegetables, extremely different from all others, and belonging to the *cryptogamia* class of Linnæus.

The fungi have, indeed, so little of the common and general appearance of vegetables, that many have denied them to be such, and contended for their being only excrementitious matter, protruded from decaying vegetables of other kinds. But notwithstanding the fungi have neither the colour or texture of other plants, nor leaves nor flowers like them; yet they must be allowed to belong to the vegetable kingdom, as having absolute and perfect seeds, consisting usually of single antheræ, which produce plants like those from which they are collected.

The fungi are extremely different in figure, and in their manner and place of growth; some growing on the ground, some on living trees, and many on decayed wood; and that horizontally or erect. Some are of only a few days duration, others remain for years, and some there are which grow under the surface of the earth in no particular direction.

To the order of fungi belong a great many genera, as agaric, boletus, phallus, lycoperdon, &c. See **AGARIC**, &c.

**FUNICULUS UMBILICALIS**, in anatomy. See **FOETUS** and **NAVEL-STRING.**

**FUNNEL** of a chimney, the shaft or smallest part of the waste, where it is gathered into its least dimensions.

Palladio directs, that the funnels of chimneys be carried through the roof four or five feet at least, that they may carry the smoke clear from the house into the air. See the article CHIMNEY.

He also advises, that chamber-chimneys be not made narrower than ten or eleven inches, nor broader than fifteen; for if too narrow, the smoke will not be able to make its way; and, if too wide, the wind will drive it back into the room.

**FUNNEL-FASHIONED**, or **FUNNEL-SHAPED-FLOWERS**, in botany. See the article INFUNDIBULIFORM.

**FUR**, or **FURR**, in commerce. See **FURR**.

**FURBISHER**, a person who furbishes, polishes, or cleans arms, as guns, swords, pistols, &c. which is chiefly performed with emery. See the article EMERY.

**FURCA** and **FOSSA**, in our old customs, the power of gallows and pit, or a jurisdiction of punishing felons, viz. the men by hanging, and the women by drowning.

**FURCA**, in antiquity, a piece of timber resembling a fork, used by the Romans as an instrument of punishment.

The punishment of the furca was of three kinds: the first only ignominious, when a master, for small offences, forced his servant to carry a furca on his shoulders about the city. The second was penal, when the party was led about the circus, or other place, with the furca about his neck, and whipped all the way. The third was capital, when the malefactor, having his head fastened to the furca, was whipped to death.

**FURCAM ET FLAGELLUM**, the meanest of all servile tenures, the bondman being at the lord's disposal for life and limb.

**FURCHE**, in heraldry, a cross forked at the ends. See the article CROSS.

**FURFUR**, **BRAN**. See the article **BRAN**. From their resemblance to bran, those excrementitious particles which are evacuated with the urine, are also called furfures; and for the same reason this name is also given to the scabies or scurf of the head.

**FURIES**, *eumenides*, *diræ*; certain goddesses whose office it was to punish the guilty after death. These were three in number; Alecto, Megæra, and Tisiphone, who were described with snakes instead of hair, and eyes like lightning, carrying iron-chains and whips in one hand,

and in the other flaming torches; the latter to discover, and the former to punish the guilty; and they were supposed to be constantly hovering over such persons as had been guilty of any enormous crime.

Mythologists suppose, that Tisiphone punished the crimes which sprang from hatred or anger; Megæra, those from envy; and Alecto, those from an insatiable pursuit after riches and pleasure. They were worshipped at Cafina in Arcadia, and at Carmia in Peloponnesus. They had a temple at Athens, near the Areopagus, and their priests were chosen from amongst the judges of that court. At Telphusia, a city in Arcadia, a black ewe was sacrificed to them.

**FURLING**, in the sea-language, signifies the wrapping up and binding any sail close to the yard; which is done by hauling upon the clew-lines, bunt-lines, &c. which wraps the sail close together, and being bound fast to the yard, the sail is furled.

**FURLING-LINES**, on ship-board; small lines made fast to the top-sail, top-gallant-sail, and the mizen-yard-arms, to furl up the sails by.

**FURLONG**, a long measure, equal to  $\frac{1}{2}$  of a mile, or forty poles. See the articles MEASURE, MILE, and POLE.

It is also used, in some law-books, for the eighth part of an acre. See the article ACRE.

**FURLOUGH**, in the military language, a licence granted by an officer to a soldier, to be absent for some time from his duty.

**FURNACE**, an utensil, or vessel, proper to contain fire; or to raise and maintain a vehement fire in, whether of coal or wood. See the article FIRE.

There are divers kinds of furnaces, of various forms, and for various purposes. A chemical furnace is a structure of brick, iron, or stone, capable of containing, restraining, and applying fire to vessels, wherein the chemical subjects are to receive the action of fire.

Hence a furnace requires, 1. A fireplace, wherein the fire is to be raised, kept up, and determined; and as artificial fire must be fed by fuel, a chimney becomes necessary to discharge the smoke; an ash-pit, to admit the air; and a door, where the fuel is to be thrown in. 2. In erecting a furnace, care must be taken to build it so as to preserve the strength of the fire, or not to waste it in vain; and this

this by directing it where it is particularly required. 3. A proper place must also be contrived, in which the vessels containing the subjects may receive the requisite degree of heat, for the requisite time to finish the operation.

In the building of furnaces, regard must be had, 1. To the quantity of fire which the fire-place ought to receive, contain, and support. 2. To the matter of the fuel to be used for the purpose. 3. To the degree of heat required in every operation; since in the same fire-place the same quantity of the same fuel may produce different degrees of heat. Whence, 4. The air must always have access to the fire-place; and the force with which the air tends to the fire, under the form of wind or blast, should be computed. 5. The air-vent from the fire should be principally regarded, for if this be wide, the air here diffuses, and loses itself; or acts but little upon the subject, where its force ought to be collected.

The first or most simple chemical furnace, according to Boerhaave, is constructed as follows. Make a hollow box, with a square basis, of sound, dry oak, nine inches wide, and fourteen high. Into this fix a square piece of wainscot, one inch thick, and five inches from the basis, so as to divide the furnace into two parts; the lower whereof, being five inches high, serves for the fire-place; and the upper, eight inches high, is to receive the retort for distillation. This piece of wainscot, serving as a partition, must have a round hole in the middle, five inches over, where the round bottom of the vessel is to rest. Besides this large hole in the partition, there must be four other round holes made in it, each an inch in diameter, that the heat of the fire may rise freely from the fire-place into the second story. On one side of the fire-place there must be a door going upon hinges, and equal in dimensions to the whole side, or nine inches broad, and five high, so as to open easy, and shut close. The whole internal fire surface of this fire-place must be lined with plated iron or copper, to defend the wood from the fire. The door is to have four round holes made in it, each of them an inch in diameter, to admit the external air; and these holes are to be fitted with four cylindrical stoppers, to regulate the fire, by admitting and excluding the air. This

door must be made of seasoned wood, and made to shut extremely close. In the upper part of the furnace, the side above the door must have a square hole cut in the middle, to the top of it, four inches and a half over; the inner edge of which is to be cut away on its three sides to half the thickness of the board, or to the breadth of half an inch. And to the internal sloping surface about this hole, a plate of wood must be so fitted as to make a joint; this being of use to shut the side of the furnace close, when we design to distil, digest, or exhale in a cucurbit, phial, or evaporating glass: whereas the plate of wood being taken away, fits the furnace for distillation by the retort. There must also be another similar plate of wood with a hole in the middle, two inches and a half over, so as to let the neck of the retort pass through it, when fitted into the square hole, instead of the former. A pair of folding-doors should also be made to serve as the flat top, or cover to the furnace; the middle part of which doors must be cut into a round hole of five inches diameter, to let out the neck of the cucurbit, or bolt head, used in digestion. In the last place, there must be a round flat piece of wood, six inches in diameter, to cover this upper orifice, when the furnace is used for distilling by the retort. See a view of this furnace in plate CVIII. fig. 2. n<sup>o</sup> 1. In order to work this furnace, we must be provided with a square flat-bottomed earthen pan, (*ibid.* A) standing upon three feet, about half an inch high; the height of the pan being from the bottom of the furnace to its upper rim three inches and an half: at the bottom of this pan a little sifted ashes must be lightly sprinkled, a quarter of an inch thick; then an ignited coal of dutch turf, first burnt till it yields no longer smoke, is to be laid upon this bed of ashes, and covered by sifting more of the same ashes lightly upon it, whereby an equable, moderate heat may be kept up for near twenty-four hours.

This furnace works without yielding any smoke, or disagreeable smell, and affords so gentle and equable a heat, that in the opinion of Boerhaave, eggs may be hatched by it: tho' it may be raised high enough to make water boil, or higher; and of course will commodiously perform all kinds of digestions and distillations of aqueous and spirituous li-

quors, volatile, alkaline salts, and volatile aromatic salts, or tinctures, exhalations, &c.

If a furnace be required capable of giving a stronger heat, so as to distil in sand, the best contrivance, according to Boerhaave, is the following, for making portable furnaces, these being the most commodious, on account of leaving the chimney of the laboratory free. Let a hollow cylinder, CGHD, (*ibid.* n<sup>o</sup> 2.) be made of thin iron-plate, seventeen inches in diameter, and nineteen inches high; the lower end to be closed, and the upper end open. Let the bottom be supported with three iron feet, twelve inches long; and let the iron bottom be covered on the inside with a copper-plate, lest the salt in the ashes should otherwise soon corrode the iron. Let a grate, *y*, be fixed in this cylinder, so that the upper surface thereof, being parallel to the base of the cylinder, may rise four inches above it. Let the grate be surrounded with a flat ring of plated iron, three inches and an half broad. Let the bars of the grate be flat, half an inch wide, and set at the distance of an inch from each other. This iron rim of the grate must rest upon three pins sticking out by the inside of the furnace, to fix the grate. Let the ash-place, NOPQ, be fitted with an iron door, four inches high, and six inches wide, to move upon hinges, and shut exactly close. At the height of three inches from the upper surface of the grate, let the bottom of the fire-place, TRSV, begin, and make the whole six inches wide, and four inches and an half high.

Next describe an ellipsis, ILMK, with the distance of fifteen inches between the foci, and a perpendicular of five inches from the focus to the circumference; and make a wooden model, bcde, of half such an ellipsis, cut off at the foci. This model is to serve as a core in forming the cavity of the furnace, by adjusting fine brick-work in correspondence to the figure made by revolving such a model about its axis; and thus leaving but little space between the joinings, to be exactly filled up with mortar. But before this is done, let a stopper be made for the fire-place of the same iron-plate, and the same cylindrical surface, and internal substance, as the furnace itself. The top of the cylindrical part of the furnace, KXI, must be cut into a hol-

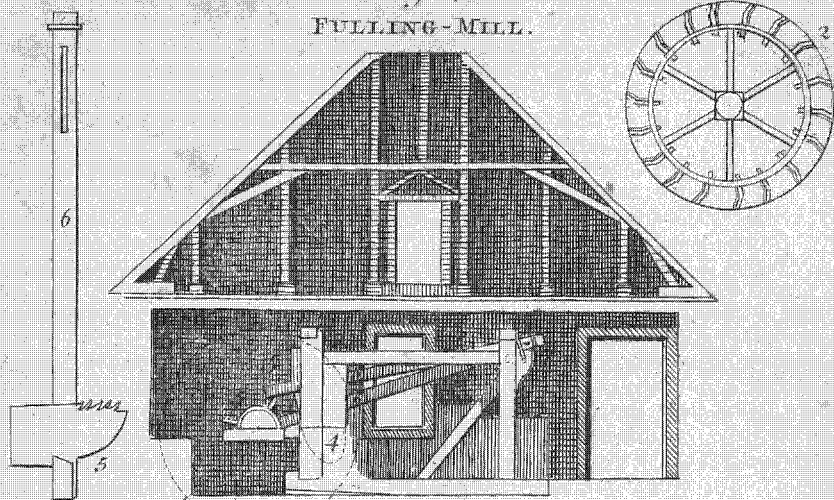
low, three inches wide, and two deep, on the same side with the door, in order commodiously to receive the neck of the retort in distillation. Lastly, an iron pot must be fitted into the upper opening of the furnace, KXI, and fixed so close and strong with brick and mortar, that the work may neither crack nor let the fire escape; but near the upper rim in this pot, there must be left in the brick-work four vent-holes, made in the form of crescents, an inch over in their widest parts, and two inches in their curvature, to discharge the smoke, and make a draught of air to animate the fire occasionally. And thus you will have a furnace fit for distilling by the cucurbit, retort, or bolt-head, and being portable, it will serve many other operations.

The third furnace, which no laboratory can be without, is a *balneum mariz*, made like the two former, excepting that the distance from the surface of the grate to the bottom of the cylindrical copper-vessel, is only eight inches. See the article *BALNEUM*.

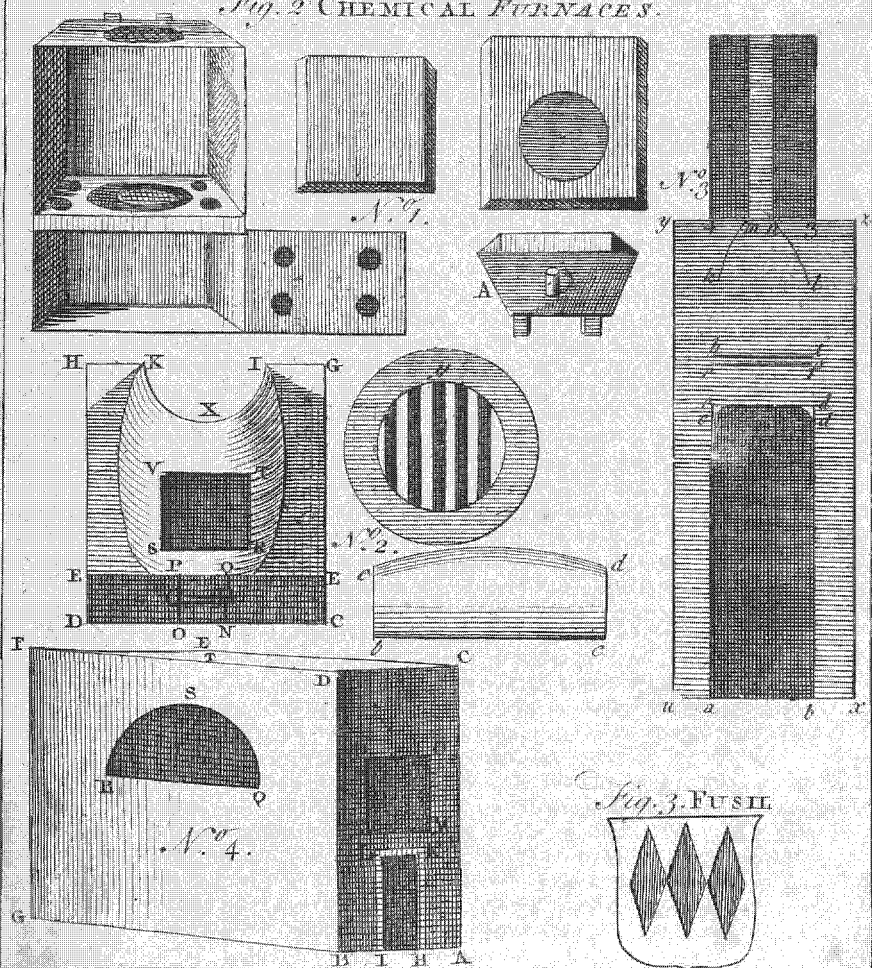
A fourth furnace is also required in a laboratory, to raise a strong fire for the melting of bodies not easily fused; the best furnace for which purpose, is made thus. Let a stone-arch, abcd, (*ibid.* n<sup>o</sup> 3.) be built three feet high, as a basis whereon to raise this furnace; then make an ash-hole, cdef, five inches high; and over that fix a grate, efib, consisting of iron bars, near an inch thick, and set at about an inch distance from each other. Let the bottom of the grate, and the ash-hole, be of a circular figure, twelve inches in diameter, *ab, cd, ef, bi*; and build up the cylinder six inches above the grate; then raise upon it a parabolic cone, kmnl, with an axis of eight inches, and its lower ordinate of six. Over this parabolic cone, build a cylindrical chimney of three inches diameter, and two feet high. In the front of the fire-place, two inches above the grate, make a door five inches wide, and six high, and arch it a-top with the arch of a circle, twelve inches in diameter. At the height of an inch above the arch of the door, make a conical hole in the furnace, two inches wide on the outside, that the operator may look downwards into the fire when any thing is melting, and let a stopper be exactly fitted to this opening. The furnace, *axy4bx3*, must be built with good brick and terras, and



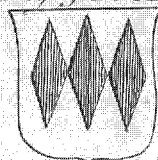
*Fig. 1.*  
FULLING-MILL.



*Fig. 2* CHEMICAL FURNACES.



*Fig. 3.* FURNACE.



*J. Jefferys sculp.*



and have its sides five inches thick, the internal surface thereof being laid smooth with cement.

A fifth furnace, ABCD, (*ibid.* n° 5.) for distilling mineral acids, as those of sea-salt, nitre, alum, vitriol, &c. is directed by Boerhaave to be built in the following manner. Upon the pavement of the laboratory, under the chimney, build up a parallelopiped, twenty inches broad in front, AB, and twenty-eight inches long, BG. Let the cavity be twelve inches wide in front, and twenty-two inches long, which gives the thickness of the wall. Let the parallelopiped be raised eleven inches high. Make a door-way, HKLI, in the middle of the front, rising eleven inches from the ground, and four inches wide, leaving an indentation on the front to receive an iron door; and let it close occasionally. This part of the apparatus regards the ash-hole and air-vent of the furnace. Instead of a grate, here use prismatic iron-bars, an inch wide, and fourteen inches long, placing them an inch asunder, parallel with the breadth of the ash-hole. Now describe an ellipsis in the upper cavity upon this parallelopiped, with the foci twenty-two inches asunder, and the transverse diameter twelve inches; whence the breadth of the fire-place will be at both ends about ten inches. Next let there be a cavity formed, of this elliptical figure, four inches and a half deep, on the inside; and complete the external part of it in a parallelopiped-form. In the front-wall, immediately over the ash-hole, make a door-way, POMN, seven inches wide, and nine inches high; and let the bottom edge of this door-way slope an inch and a half downwards, and let the lower line of the door be three inches above the upper line of the ash-hole. In the other side there must be an arched opening, RSQ, with its lower limit rising ten inches above the grate, being twenty inches long, and twelve inches high; and the elliptical arch with its foci, twenty inches asunder, and its transverse diameter twenty-four. This opening is for the distilling vessels to be put in and taken out. On the internal side, opposite to this opening, at the height of nine inches above the grate, a ledge of about an inch and a half must be left to support the vessels employed in the distillation; and in the middle of the upper part of this wall, there must be a

square hole, three inches wide, and two inches high, for the chimney. The upper elliptical arch must next be made, whose vertex is to rise twenty-one inches above the grate, the axis of the ellipsis twenty-two inches, and the transverse diameter ten. Let such an arch therefore be struck by revolving such an ellipsis about its axis, reaching sixteen inches from the grate.

When this furnace is used for distillation, two alembics are to be placed horizontally, and parallel to each other, so that their bottoms may rest upon the ledge in the opposite wall, whilst their mouths lie parallel to the opening they are put in at; which opening is now to be perfectly closed up with brick and mortar, leaving the necks of the vessels sticking out, whereto earthen pipes being applied, and their other ends fixed to receivers, the operation may be thus begun. See ALEMBIC and DISTILLATION.

For other chemical furnaces, see the article LABORATORY.

FURNACE is also applied to that used in the melting of iron, which authors frequently confound with iron-forges, though there is a considerable difference between them. See the article FORGE.

This furnace is a brick-structure, much in the shape of an egg set on end, wherein the iron-ore, after it has been burnt in a kiln, is put, intermixed with cinders and charcoal, and the whole melted till it trickle down into the receiver underneath. See the article FLUX.

Swedenborg has laid down, from his own experience, certain rules for the construction of metallurgic furnaces, by which they will always be made more advantageous to the proprietor, *cateris paribus*, than any other kind. These rules are, that the chimney be always placed as nearly as may be behind the center of the furnace; that the smaller the depth of the fire-place, provided it be sufficient to hold the coals, the better; that all furnaces must be the better the wider they are forwards; and the higher they are, so as not to lose the benefit of reverberation.

Belows-FURNACE, is one of the two kinds of furnaces used in coinage for the fusion of metals, consisting of a flat hearth at bottom, into which the air may be admitted by a hole, as in the chemical furnaces. On a level with the hearth is a second aperture, which gives passage to the

the pipe of the bellows, from whence the furnace is denominated; about a foot over this is a moveable grate; and over this is the place where the crucible is set, which is square, and made of the same earth with the crucible, of breadth sufficient to bear a range of coals around the crucible. To melt metal in this furnace, they lay a little plate of forged iron over the grate, and on this they set the crucible, which is likewise covered with an iron or earthen lid; then they fill the furnace with charcoal, and when it is well lighted, and the crucible sufficiently hot, they stop the vent-hole: lastly, throwing on fresh coals, they stop the furnace with an iron lid; thus continuing to work the bellows, and supply fresh fuel, till the metal is in fusion.

**Domestic FURNACE.** See OVEN.

**Founder's FURNACE.** See the article FOUNDRY.

**Glass-house FURNACE.** See the article GLASS.

**Glass-painter's FURNACE** is made of brick, nearly square, and about  $2\frac{1}{2}$  feet each way. It is cut horizontally in the middle, by a grate, which sustains the pan or shovel the glass is baked in. This furnace has two apertures, one below the grate, to put the fuel in at; the other above it, through which the workman spies how the action of the colours goes on.

**Hatter's FURNACES** are of three kinds: a little one under the mould, whereon they form their hats; a larger in the scouring-room, under a little copper, full of lees; and a very large one under the great copper, wherein they dye their hats.

**Plumber's FURNACE** is also of three kinds.

In the first they melt the lead whereof the sheets are to be cast, being only a large copper, or receptacle like a copper, made of free-stone, and coated well round with potter's clay, having a little iron-pan at bottom.

In the second they melt the lead to be cast in moulds for pipes, &c. which are not to be soldered.

The third is the tinning furnace, being a square frame of wood, or sometimes a mass of stone-work, with a brick-hearth whereon is made a charcoal fire, which serves them for the applying of thin tin leaves on their works.

**Wind-FURNACE,** the second furnace used in the fusion of metals for coinage. At

bottom it has a hearth made hollow, in manner of a copel, with a vent-hole in the fore part thereof; over the vent-hole is a grate, sealed in the mass of the furnace; over the grate is the place for the crucible, which is usually of forged iron. The fire being lighted, the crucible is put in, with a cover over it, and a capital or cover of earth or iron, is laid likewise over the furnace; and at the top of this capital is a hole, five or six inches in diameter. This is called a wind-furnace, by reason the air entering thro' the vent-hole at bottom, which is always open, serves the same purpose as the bellows in the other furnaces. Gold is generally melted in the bellows-furnace, as requiring an intenser heat before it fuses; but silver and copper are commonly melted in the wind-furnace.

**FURNAGE, or FORNAGE.** See the article FORNAGE.

**FURNES,** a town of Flanders, ten miles east of Dunkirk: east long.  $2^{\circ} 25'$ , and north lat.  $51^{\circ} 10'$ .

**FURNITURE of dials,** certain additional points and lines, such as the ecliptic, circles of declination, azimuths, italian hours, points of the compass, &c. drawn on dial-plates. See the article DIAL.

**FURO,** in zoology, a name given to the viverra, or ferret. See FERRET.

**FUROR UTERINUS,** a disorder peculiar to women, proceeding from an inordinate desire of coition, sometimes attended with melancholy, and sometimes with a maniacal delirium. The patient delights in talking obscenely, and in soliciting men to satisfy their desires both by words and gestures.

It is occasioned by an inflammation of the pudenda, or of the parts in which the venereal stimulus resides, which are chiefly the clitoris and vagina; or in the too great abundance and acrimony of the fluids of those parts; or both these causes may exist together.

In the delirium maniacum, the patient is entirely shameless; but in the melancholicum more reserved, and her folly is confined to fewer objects. If it continues a month or two, the fault of the brain becomes obstinate, for it degenerates into real madness.

The indications of cure are to diminish the heat and sensibility of the affected parts, to cool, sweeten, and dilute the blood, and so render it balsamic; or to pursue both intentions at once. The first

first indication is answered by frequent and copious bleedings: the must likewise be purged with jalap, scammony, or diagridium. Emetics are also good; and emollient clysters should be given; to which add a drachm and a half of sal prunella, or a little vinegar, morning and night. To abate the acrimony, the patient may drink mineral waters, or emulsions with chicken-broth, and feeds of papav. alb. lin. cannabis, &c. and sweetened. In the summer, whey with half a drachm of sal prunel. for each dose. After which she should be kept to a milk diet only.

In a delirium melancholicum, lawful co-ition may be admitted.

**FURR**, in commerce, signifies the skin of several wild beasts, dressed in alum with the hair on, and used as a part of dress by princes, magistrates, and others. The kinds most in use are those of the ermine, sable, castor, hare, coney, &c. See the articles **ERMINE**, **SABLE**, &c. Furrs are charged with various duties.

Badger-skins pay, the piece,  $5 \frac{74\frac{1}{2}}{100}$  d. whereof  $5 \frac{17\frac{1}{2}}{100}$  d. is drawn back on ex-

portation. Bear-skins, if black or red, pay each 4s.  $9 \frac{45}{100}$  d. and draw back 4s.  $3 \frac{75}{100}$  d. but if white, each skin pays 9s.  $6 \frac{80}{100}$  d. and draw back 8s.  $7 \frac{60}{100}$  d.

Beaver-skins pay each  $7 \frac{18\frac{1}{2}}{100}$  d. and draw back  $4 \frac{34\frac{1}{2}}{100}$  d. Cats-skins, the hundred,

containing five score, pay 9s.  $6 \frac{20}{100}$  d. and draw back 8s.  $7 \frac{20}{100}$  d. Ermines, the timber, containing forty skins, pay 9s.  $6 \frac{20}{100}$  d. and draw back 8s.  $7 \frac{1}{2}$  d.

Fox-skins, the ordinary kind, pay only  $3 \frac{83}{100}$  d. each, and draws back  $3 \frac{48}{100}$  d. but each black fox-skin pays 2l. 7s.  $10 \frac{80}{100}$  d. and draw back 2l. 3s.  $1 \frac{50}{100}$  d.

Leopard-skins, the piece, pay 5s.  $8 \frac{1}{2}$  d. and draw back 5s.  $4 \frac{68\frac{1}{2}}{100}$  d.

Matrons the timber, containing forty skins, pay 2l. 7s.  $10 \frac{80}{100}$  d. and draw back 2l. 3s.  $1 \frac{50}{100}$  d. Mole-skins, the

dozen, pay  $1 \frac{43\frac{3}{8}}{100}$  d. and draw back  $1 \frac{29\frac{3}{8}}{100}$  d. Otter-skins, the piece, pay

1s.  $2 \frac{36\frac{1}{2}}{100}$  d. and draw back 1s.  $\frac{93\frac{1}{2}}{100}$  d.

Ounce skins, the piece, pay 2s.  $11 \frac{60\frac{1}{2}}{100}$  d. and draw back 2s.  $8 \frac{34\frac{3}{4}}{100}$  d. Sables or

all sorts, the timber, containing forty skins, pay 7l. 3s.  $7 \frac{80}{100}$  d. and draw back 6l. 9s.  $4 \frac{80}{100}$  d. Weazle-skins, the dozen, pay  $\frac{95\frac{1}{2}}{100}$  d. and draw back

$86\frac{1}{4}$  d. Wolf-skins tawed, the piece, pay  $\frac{700}{100}$  s.  $2 \frac{17\frac{1}{2}}{100}$  d. and draw back 6s.  $5 \frac{62\frac{1}{2}}{100}$  d.

Wolf-skins untawed, the piece, pay 5s.  $6 \frac{6\frac{1}{2}}{100}$  d. and draw back 4s.  $11 \frac{51\frac{1}{2}}{100}$  d. If

any furrs be tawed, or otherwise drest, they pay 6s. more for every 20s. value.

**FURRS**, in heraldry, a bearing which represents the skins of certain beasts, used as well in the doublings of the mantles belonging to the coat-armour, as in the coat-armours themselves. See the articles **ERMINE**, **ERMINOIS**, &c.

**FURR**, among carpenters, a piece nailed upon a rafter, to strengthen it when decayed, or to make it straight when it has sunk in the middle.

**FURRING**, among carpenters, is the regular fashioning out any part. When the main piece of the material is scanty, either by defects, wains, or want of thickness; then a piece of the same is put behind it to make good its thickness, which is called a furr.

**FURSTENBURG**, a town and castle of Germany, the capital of a county of the same name, thirty miles north-west of Constance: east lon.  $8^{\circ} 30'$ , and north lat.  $47^{\circ} 50'$ .

**FURSTENFIELD**, a town of Austria and dutchy of Stiria, thirty-six miles east of Gratz: east lon.  $16^{\circ} 46'$ , and north lat.  $47^{\circ} 26'$ .

**FURUNCLE**, or **BOIL**, in surgery, a small resisting tumour, with inflammation, redness, and great pain, arising in the adipose membrane, under the skin.

As there is no part of the body free from being the subject of furuncles, so the whole is sometimes so miserably infested with them, that the patient can hardly tell how to stir himself, or on what part to lie. Not only adults, but also the younger, even new-born infants, are obnoxious to this dreadful disorder, which occasions in them most fatiguing clamour and

and restlessness. Though there is little danger in this disease in adults; yet, in tender infants, it occasions convulsions, and even death itself.

The principal cause of furuncles is a too glutinous and inspissated state of the blood; and, consequently, the greater the inspissation, the worse and more numerous will be the furuncles.

With regard to the cure, it seems to consist chiefly in restoring the stagnating blood to its former circulation and free motion.

When the furuncles are very numerous, or return again, it is proper to use internal purging medicines, and such as attenuate and cleanse the blood. In adults, bleeding is proper, both by the lancet and scarification with cupping; and, at the same time, a strict regimen of diet should be used, drinking frequently and plentifully of a decoction of the woods, and such like attenuators of the blood. The patient should also entirely abstain from drinking fermented and spirituous liquors, particularly wine and its spirit; and from the too frequent use of tobacco. When the disorder is recent, external medicines only will frequently suffice for the whole cure. For this purpose a mixture of honey, acidulated with spirit of vitriol till it has acquired a considerable sharpness, is proper to anoint the furuncles. Of no less virtue is the frequent touching them with mere spirit of vitriol or sulphur. Discutient plasters are also found very serviceable, as those of simple diachylon, de melito, de sperma ceti, vel dialaponis.

But if these medicines prove insufficient to disperse the tumour, it is to be brought to suppuration, by applying a plaster made of honey and flour, or of diachylon with the gums; and where these are insufficient, to make use of the maturating cataplasms recommended under the article PHLEGMON.

When the furuncle is known to be ripe, by its softness and yellow head, recourse is to be directly had to the scalpel; and having made an opening, the corrupted matter contained therein is to be discharged; after this, a plaster of diachylon must be applied, and the ulcer daily cleansed of its matter, till it is healed.

Pustules and pimples arising in the face, are to be treated like furuncles; and, in both cases, the drinking of whey, and the mineral waters, is accounted good for cleansing the blood,

When sucking infants are afflicted with furuncles, it is proper to give the mother, or nurse, some purging medicine, and to order a strict regimen and diet. At the same time the infant should take some gentle laxative medicine, with absorbent powders, to allay the acrimony of its juices. *Heister.*

FURUNCULUS, in zoology, a name given to the ferret. See FERRET.

FURZE, or FURZE-BUSH, in botany. See the article ULEX.

In many countries, where there are dry banks, or dry sand or gravel, that nothing else will grow on, furze makes an extremely good fence; and is propagated either by sets or seeds, especially the latter. It will make a good hedge in three years, if well weeded and carefully kept from cattle, especially sheep; and if clipped, it will thrive extremely, and be very thick; but if let grow at large, it will prove the better shelter, and yield excellent fuel. It proves also an admirable covert for wild-fowl.

Sometimes, indeed, furze over-runs the pasture, or arable-lands; in which case it is to be grubbed up, or it may be destroyed by only marling the lands.

Furze-faggots are used for breeming ships, when in the dock to be cleaned, or under repair.

FUSA, in the Italian music, the same with our quaver. See the article QUAYER.

FUSANUS, in botany, a shrub otherwise called euonymus. See EUONYMUS.

FUSAROLE, in architecture, a moulding or ornament placed immediately under the echinus, in the doric, ionic, and composite capitals.

It is a round member, carved in the manner of a collar, or chaplet, with oval beads; and should always answer exactly under the eye of the volute, in the ionic capital.

FUSEE, in clock-work, is that conical part drawn by the spring, and about which the chain or string is wound; for the use of which, see the articles CLOCK and WATCH.

FUSEE, or FIRELOCK. See the article MUSQUET.

FUSEE of a bomb. See BOMB.

FUSIBILITY, in natural philosophy, that quality of bodies, which renders them fusible. See the article FUSION.

FUSIBLE COLUMN. See COLUMN.

FUSIL, in heraldry, a bearing of a rhomboidal figure, longer than the lozenge, and

and having its upper and lower angles more acute and sharp than the other two in the middle. It is called in latin *fusus*, a spindle, from its shape. See plate CVIII. fig. 3.

**FUSILIERS**, or **FUSILEERS**, in the military art, are foot-soldiers, armed with fuses, or firelocks. See **FUSEE**.

**FUSILY**, or **FUSILE**, in heraldry, signifies a field, or ordinary, entirely covered over with, or divided into fusils. See the article **FUSIL**.

**FUSION**, the melting of metals, minerals, &c. by means of fire.

Different metals run in different manners from their ores : thus, lead, though extremely fusible in the metal, runs with difficulty from the ore, so as to require a considerable violence of fire. This stubbornness not belonging to the metal, must be attributed to the stony, sulphureous, or other mineral matter with which the ore is mixed ; which matter seems to require a degree of heat capable of vitrifying the lead, before the metal will run : but then the lead thus vitrified, recovers a metallic form again, by coming in contact with the coals. See **LEAD**.

Tin runs from its ore with greater ease than lead, and is therefore smelted in much less furnaces ; but copper requires an intense heat, or a blast furnace ; and iron the greatest heat that can be given in a furnace : and both iron and copper absolutely require immediate contact with the fuel employed. Hence it appears that each metal must have its determinate degree of heat, to run it with advantage from the ore or stone.

In order, likewise, to obtain the metal from the ore to the best advantage, the scoria or slag must be necessarily made to run thin and fluid ; otherwise it entangles or inviscates the metal, and will not let it separate fully. And hence we frequently observe in the assaying of copper-ores, small grains of metal interspersed here and there, among the scoria, that require to be separated by stamping and washing the whole mass ; which labour might have been prevented, by using a proper degree of heat capable of procuring a thin fusion and a suitable flux, so as to have made all the metals fall to the bottom of the crucible ; which it constantly does, when the operation is well performed. See **FLUX**.

It seems principally owing to a defect in the knowledge of fusion, that so many

recrements or slags of metals, antiently thrown as useless from the furnace, have been of late wrought to considerable profit by more skilful workmen : at least it seems more rational to attribute the success to this cause, than to a supposed growth of metals in such slags ; or to believe that lead has grown rich in silver by lying exposed to the open air, while perhaps it is rather owing to the unskilfulness of the former workmen, who were unable to separate all the silver contained in the lead.

All moisture, and too sudden cooling, prove prejudicial to the more ignoble metals after fusion, and sometimes dangerous to the operator : for a little water falling upon melted iron or copper, makes them expand with prodigious violence, and discharge themselves abroad with a force like that of a cannon : and even sudden cooling will often occasion the surface of the metal to crack, and suffer the more internal part, not yet set or fixed, to issue out to a considerable distance ; whence either the loss of the metal or mischief may ensue.

To prevent these ill effects, after copellation it is usual for the operator to throw a quantity of water, all at once, upon the lump of silver, as it lies in the test, at the moment when it begins to grow rigid ; for the water, by its coldness, suddenly makes so thick a cover upon the surface of the silver, that the hotter parts in the inside cannot break through the upper. *Shaw's Chem. Lect.*

**FUST**, the same with the shaft of a column. See the articles **COLUMN** and **SHAFT**.

**FUSTIAN**, in commerce, a kind of cotton stuff, which seems as it were whaled on one side.

Right fustians should be altogether made of cotton-yarn, both woof and warp ; but a great many are made, of which the warp is flax, or even hemp.

There are fustians made of several kinds, wide, narrow, fine, coarse ; with flag or nap, and without it.

The duties on fustians imported, are so high as to amount in a manner to a prohibition : for instance, dutch and milan fustians, the piece, containing two half pieces of fifteen yards the half piece, pay 1 l. 10 s. 9  $\frac{1}{2}$  d. draw back 1 l. 7 s. Holmes and bevernex fustians, the bale, containing forty-five half pieces, pay 15 l. 8 s. draw back 13 l. 10 s. Naples fustians,

fustians, tripe or velure plain, the yard, pay 1s. 11,  $\frac{1}{8}$  d. draw back 1s. 8,  $\frac{1}{8}$  d. Naples fustians, wrought, called sparta velvet, the yard, pay 3s.  $\frac{1}{8}$  d. draw back 2s. 8,  $\frac{4}{8}$  d.

**FUSTICK**, or **FUSTOCK**, a yellow wood, that grows in all the Caribbee-islands, used in dying yellow.

It pays no duty on importaion.

**FUTTOCKS**, in a ship, the timbers raised over the keel, or the encompassing-timbers that make her breadth. Of these there are first, second, third, and fourth, denominated according to their distance from the keel, those next it being called first or ground-futtocks, and the others upper-futtocks: those

timbers, being put together, make a frame-bend.

**FUTURE**, in general, denotes whatever regards futurity, or the time to come. See the article **TIME**.

**FUTURE TENSE**, among grammarians. See the article **TENSE**.

**FUZEE**, or **FUSEE**, in military affairs. See the article **FUSEE**.

**FUZEE**, among fashiers, two dangerous splents, joining from above downwards. They differ from screws or thorough splents in this, that the latter are placed on two opposite sides of the leg. See the article **SPLINT**.

**FUZILIER**, or **FUSILIER**, in the art of war. See the article **FUSILIER**.



## G.

**G**, in grammar, the seventh letter and fifth consonant of our alphabet; but in the greek, and all the oriental languages, it occupies the third place. It is one of the mutes, and cannot be sounded without the assistance of some vowel.

In english it has a hard and soft sound; hard, as in the words *game*, *gun*, &c. and soft, as in the words *gesture*, *giant*, &c. at the end of words, *gh* is pronounced like *ff*, as in the words *rough*, *tough*, &c. The letter *g* is also used in many words where the sound is not perceived, as in *sign*, *reign*, &c.

As a numeral, **G** was antiently used to denote 400; and with a dash over it, thus  $\overline{G}$ , 40,000. In music it is the character or mark of the treble cleff; and from its being placed at the head, or marking the first sound in Guido's scale, the whole scale took the name gamut. See the articles **CLEF** and **GAMUT**.

As an abbreviature, **G**. stands for *Gaius*, *Gellius*, *gens*, *genius*, &c. **G. G.** for *gemina*, *gestit*, *gesserunt*, &c. **G. C.** for *genio civitatis*, or *Cæsaris*. **G. L.** for *Gaius libertus*, or *genio loci*. **G. V. S.** for *genio urbis sacrum*. **G. B.** for *genio bono*. And **G. T.** for *genio tutelari*.

**GABARA**, or **GABBARA**, in antiquity, the dead bodies which the Egyptians em-

balmed, and kept in their houses, especially those of such of their friends as died with the reputation of great piety and holiness, or as martyrs. See the articles **EMBALMING** and **MUMMY**.

**GABEL**, a word met with in old records, signifying a tax, rent, custom, or service, paid to the king, or other lord.

**GABEL**, or **GAVEL**, among builders. See the article **GAVEL**.

**GABEL**, according to the french duties or customs, a tax upon salt, which makes the second article in the king's revenue, and amounts to about one fourth part of the whole revenue of the kingdom.

**GABIN**, a town of great Poland, forty-six miles north-west of Warsaw: east lon. 20°, and north lat. 52° 35'.

**GABIONS**, in fortification, baskets made of osier-twigs, of a cylindrical form, six feet high, and four wide; which being filled with earth, serve as a shelter from the enemies fire.

They are commonly used on batteries, to screen the engineers, &c. in order to which, one is placed on either side of each gun, room being only left for the muzzle to appear through. They also serve as a parapet on lines, lodgements, &c. when the ground is too hard to dig into.

There are a smaller sort, used on parapets in trenches, &c. to cover the musqueteers;





Fig. 1. GAGES.

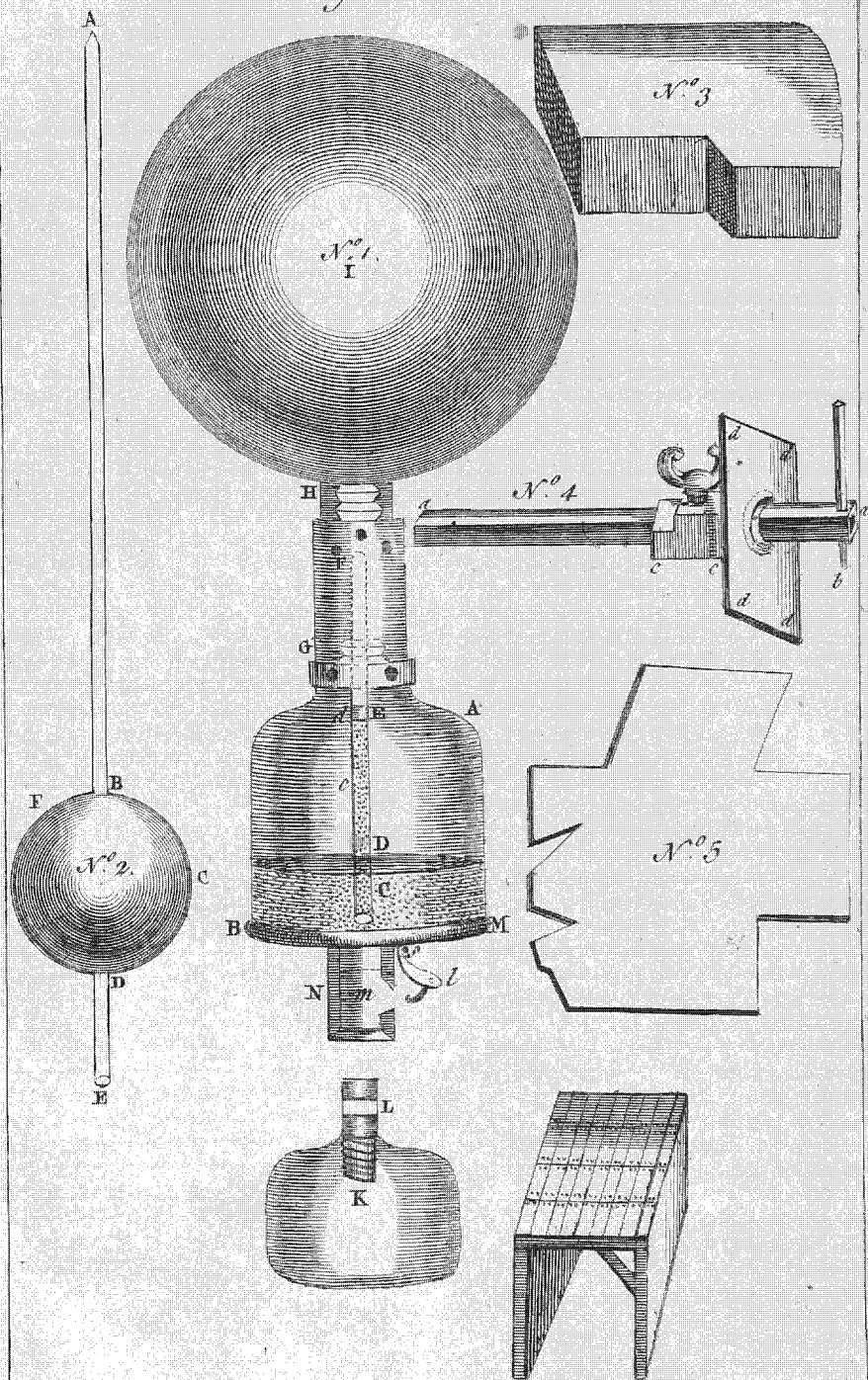


Fig. 2. GALLERY.

queteers; which are placed so close, that a musquet can but just peep through.

To render the gabions useless, the enemy endeavours to set them on fire, by throwing pitched faggots among them.

**GABLE**, or **GAVEL**, among builders. See the article **GAVEL**.

**GABLOCKS**, the artificial spurs of gamecocks. See the article **GAME-COCK**.

**GABRES**, or **GAURS**, in the religious customs of Persia. See **GAURS**.

**GAD**, among miners, a small punch of iron, with a long wooden handle, used to break up the ore.

One of the miners holds this in his hand, directing the point to a proper place, while the other drives it into the vein, by striking it with a sledge-hammer.

**GAD-FLY**, or **BREEZE-FLY**, names given to the black and yellow bodied cæstrus, a fly nearly as large as the common blue flesh-fly. See the article **OESTRUS**.

**GADUS**, in ichthyology, a genus of malacopterygious fishes; the head of which is usually compressed; the branchiostegæ membrane on each side contains six small bones; and the back-fins are either two or three in number.

This is a large genus, comprehending the whiting, cod, haddock, ling, whistfish, &c. See **WHITING**, **COD**, &c.

**GADWAL**, in ornithology, a species of duck, about the size of a widgeon. See the article **DUCK**.

**GAFOLD-LAND**, in old law-books, land liable to taxes, and let for rent.

**GAGATES**, **JET**, in natural history. See the article **JET**.

**GAGE**, in law-books, the same with surety or pledge. See the articles **SURETY** and **PLEDGE**.

Thus, where a person has taken distress, and being sued in replevin, he shall not only avow the distress, but gager deliverance; that is, put in sureties, or pledges, that he will deliver them. See the article **DISTRESS**.

**GAGE** is also used in a synonymous sense with wage. See the article **WAGE**.

**Mort-GAGE**. See **MORTGAGE**.

**GAGE**, in the sea-language. When one ship is to windward of another, she is said to have the weather-gage of her. They likewise call the number of feet that a vessel sinks in the water, the ship's gage: this they find by driving a nail into a pike near the end, and putting it down beside the rudder till the nail catch hold under it; then as many feet as the pike is under water, is the ship's gage.

**GAGE**, in joinery, an instrument marked G, in Plate of Joinery, in which the piece of wood *b*, is moveable upon the staff *c*, so as to be set nearer or farther from the tooth *a*, at pleasure. Its use is to draw a line parallel to the straight side of any board, for gaging tenons, and marking stuff to an equal thickness.

**GAGE**, among letter-founders, a piece of box, or other hard wood, variously notched; the use of which is to adjust the dimensions, slopes, &c. of the different sorts of letters. See **FOUNDERY** and **LETTER**.

There are several kinds of these gages, as the flat-gage, represented in plate CIX. fig. 1. n° 3. and the face-gage and italic-gage, &c. *ibid.* n° 5.

**Sliding-GAGE**, a tool used by mathematical instrument makers, for measuring and setting off distances. It is also of use in letter-cutting, and making of moulds. See plate CIX. fig. 1. n° 4. where *aa* is the beam, *b* the tooth, *cc* the sliding socket, and *dddd* the shoulder of the socket.

**Sea-GAGE**, an instrument invented by Dr. Hales and Dr. Desaguliers, for finding the depth of the sea, the description whereof is this. *AB* (plate CIX. fig. 1. n° 1.) is the gage-bottle, in which is cemented the gage-tube *Ff*, in the brass-cap at *G*. The upper end of the tube *F*, is hermetically sealed, and the open lower end *f*, is immersed in mercury, marked *C*, on which swims a small thickness or surface of treacle. On the top of the bottle is screwed a tube of brass *HG*, pierced with several holes, to admit the water into the bottle *AB*. The body *K*, is a weight, hanging by its shank *L*, in a socket *N*, with a notch on one side at *m*, in which is fixed the catch *l* of the spring *S*, and passing through the hole *L*, in the shank of the weight *K*, prevents its falling out, when once hung on. On the top, in the upper part of the brass-tube at *H*, is fixed a large empty ball, or full-blown bladder *I*, which must not be so large, but that the weight *K* may be able to sink the whole under water.

The instrument, thus constructed, is used in the following manner. The weight *K* being hung on, the gage is let fall into deep water, and sinks to the bottom; the socket *N*, is somewhat longer than the shank *L*, and therefore, after the weight *K* comes to the bottom, the gage will continue to descend, till the lower

part of the socket strikes against the weight; this gives liberty to the catch to fly out of the hole L, and let go the weight K; when this is done, the ball or bladder I, instantly buoys up the gage to the top of the water. While the gage is under water, the water having free access to the treacle and mercury in the bottle, will by its pressure force it up into the tube Ff, and the height to which it has been forced by the greatest pressure, *viz.* that at the bottom, will be shewn by the mark in the tube which the treacle leaves behind it, and which is the only use of the treacle. This shews into what space the whole air in the tube Ff is compressed; and consequently the height or depth of the water, which by its weight produced that compression, which is the thing required.

If the gage-tube Ff, be of glass, a scale might be drawn on it with the point of a diamond, shewing, by inspection, what height the water stands above the bottom. But the length of 10 inches is not sufficient for fathoming depths at sea, since that, when all the air in such a length of tube is compressed into half an inch, the depth of water is not more than 634 feet, which is not half a quarter of a mile.

If, to remedy this, we make use of a tube 50 inches long, which for strength may be a musquet-barrel, and suppose the air compressed into an hundredth part of half an inch; then by saying as 1:99::490:39600 inches, or 3300 feet; even this is but little more than half a mile, or 2640 feet. But since it is reasonable to suppose the cavities of the sea bear some proportion to the mountainous parts of the land, some of which are more than three miles above the earth's surface; therefore, to explore such great depths, the Dr. contrived a new form for his sea-gage, or rather for the gage-tube in it, as follows: BCDF (*ibid.* n° 2.) is a hollow metalline globe communicating on the top with a long tube AB, whose capacity is a ninth part of that globe. On the lower part at D, it has also a short tube DE, to stand in the mercury and treacle. The air contained in the compound gage-tube is compressed by the water, as before; but the degree of compression, or height to which the treacle has been forced, cannot here be seen thro' the tube; therefore, to answer that end, a slender rod of metal or wood, with a knob on the top of the tube AB, will

receive the mark of the treacle, and shew it, when taken out.

If the tube AB be 50 inches long, and of such a bore that every inch in length should be a cubic inch of air, and the contents of the globe and tube together 500 cubic inches; then, when the air is compressed within an hundredth part of the whole, it is evident the treacle will not approach nearer than 5 inches of the top of the tube, which will agree to the depth of 3300 feet of water as above. Twice this depth will compress the air into half that space nearly, *viz.* 2½ inches, which correspond to 6600 which is a mile and a quarter. Again, half that space, or 1½ inch, will shew double the former depth, *viz.* 13200 feet, or 2½ miles, which is probably very nearly the greatest depth of the sea.

*Bucket-sea-GAGE*, an instrument contrived by Dr. Hales, to find the different degrees of coolness and saltness of the sea, at different depths; consisting of a common household pail or bucket, with two heads to it. These heads have each a round hole in the middle, near four inches diameter, and covered with valves opening upwards; and that they might both open and shut together, there is a small iron-rod fixed to the upper part of the lower valve, and at the other end to the under part of the upper valve; so that as the bucket descends with its sinking weight into the sea, both the valves open by the force of the water, which by that means has a free passage through the bucket. But when the bucket is drawn up, then both the valves shut by the force of the water at the upper part of the bucket; so that the bucket is brought up full of the lowest sea-water to which it had descended.

When the bucket is drawn up, the mercurial thermometer, fixed in it, is examined; but great care must be taken to observe the degree at which the mercury stands, before the lower part of the thermometer is taken out of the water in the bucket, else it would be altered by the different temperature of the air.

In order to keep the bucket in a right position, there are four cords fixed to it, reaching about four feet below it, to which the sinking weight is fixed.

*Water-GAGE*, or *HYDROMETER*. See the article *HYDROMETER*.

*GAGES for grinding optic glasses*. See the article *GRINDING*.

**GAGER** and **GAGING**. See the articles **GAUGER** and **GAUGING**.

**GAHALA**, a name given by some to the colocasia, or great egyptian arum. See the article **ARUM**.

**GAIANITES**, *gaianita*, in church-history, a branch of eutyrians. See the article **EUTYCHIANS**.

**GAIETA**, a strong fortified town of the kingdom of Naples, in Italy, thirty-five miles north-west of the city of Naples : east lon.  $14^{\circ} 30'$ . and north lat.  $41^{\circ} 20'$ .

**GAIN**, in commerce, is used in a synonymous sense with profit. See the article **PROFIT**.

**GAIN**, in architecture, the bevelling shoulder of a joist or other timber.

It is also used for the lapping of the end of the joints, &c. upon a trimmer or girder, and then the thickness of the shoulder is cut into the trimmer, also bevelling upwards, that it may just receive the gain, and so the joist and trimmer lie even and level with the surface.

This way of working is used in floors and hearths.

**GAINAGE**, in old law-books, properly signifies the plough-tackle, or implements of husbandry ; but is also used for the grain or crop of ploughed lands.

**GAINERY**, in old law-books, denotes tillage, or the profit thence arising.

**GAINSBOROUGH**, a market-town of Lincolnshire, fourteen miles north-west of Lincoln ; which gives the title of earl to the noble family of Noel.

**GAIOPHRAGMIA**, in natural history, a genus of septariæ, divided by septa or partitions of earthy matter, of which there are several species. See **SEPTARIÆ**.

**GALACTITES**, in natural history, the name by which the antients called a smooth, ash-coloured, indurated kind of clay, said to have been used with success for defluxions and ulcers of the eyes, and as an astringent. See the article **CLAY**.

**GALANGALS**, *galanga*, in the materia medica, the name of two roots kept in the shops, a greater and a smaller ; of which the smaller is by far most esteemed.

The lesser galangal is a small and short root, of an irregular figure, and of the thickness of a man's little finger, seldom met with more than an inch or two long. It should be chosen full and plump, of a bright colour, very firm and sound, and of an acrid and insupportably hot taste.

The larger galangal is brought to us in pieces of two inches or a little more in length, and of near an inch in thickness : its surface is less unequal and tuberoser than the smaller sort, but is far from being smooth ; on the outside it is of a brown colour, with a very faint cast of red, and within it is of a paler colour, and has a much less acrid and pungent taste than the smaller kind. It is to be chosen in the largest, soundest, and heaviest pieces.

The roots of both the galangals, but particularly of the lesser, abound with a volatile, oily, aromatic salt ; the lesser is esteemed an excellent stomachic : it has the credit of being a great cephalic, cardiac, and uterine, but is more particularly recommended in vertigos. The greater galangal possesses the same virtues, but in a less degree. See the article **KÆMPFERIA**.

**GALANT**, or **GALLANT**. See the article **GALLANT**.

**GALANTHUS**, the **SNOW-DROP**, in botany, a genus of the *hexandria-monogynia* class of plants, the flower of which consists of three oblong and obtuse petals ; the fruit is a globose-oval capsule, obtusely trigonal, and containing a great number of roundish seeds.

The galanthus is the same with the narcissus-leucoium of authors, with a large snow-white flower.

**GALATA**, a great suburb belonging to Constantinople, opposite to the seraglio, on the other side of the harbour. It is here that the Greeks, Armenians, Franks, Christians, and Jews inhabit, and are allowed the exercise of their respective worships.

**GALATIA**, the antient name of Amasia, a province of lesser Asia.

**GALATIANS**, or *Epistle to the GALATIANS*. See the article **EPISTLE**.

**GALAXIUS**, a name given by the antients to morochthus. See **MOROCHTHUS**.

**GALAXY**, in astronomy, the *via lactea*, or milky way in the heavens : a tract of a whitish colour, and considerable breadth, which runs through a great compass of the heavens, sometimes in a double, but for the greatest part of its course in a single stream ; and is composed of a vast number of stars, too minute or too remote from the earth, to be distinguished by the naked eye ; but are discovered in all parts of it, in great numbers, by the assistance of the telescope.

**GALBANUM**,

**GALBANUM**, in pharmacy, a gum issuing from the stem of an umbelliferous plant, growing in Persia and many parts of Africa.

It is sometimes met with in the shops in loose granules, called drops or tears, and sometimes in large masses, formed of a number of these blended together; but in these masses some accidental foulness is often mixed with the gum. The single drops usually approach to a roundish, oblong, pear-like form. Galbanum is soft like wax, and, when fresh drawn, white; but it afterwards becomes yellowish or reddish: it is of a strong smell, of an acrid and bitterish taste; it is inflammable in the manner of a resin, and soluble in water like a gum.

It attenuates and dissolves tough phlegm, and is therefore of service in asthma and inveterate coughs: it is also of great service in hysteric complaints; it dissipates flatulencies, promotes the menses, and facilitates delivery and the expulsion of the secundines. It is given in pills and electuaries, and is used externally in form of a plaster, applied to the belly, against habitual hysteric complaints, and on many other occasions.

**GALBULA**, in ornithology, the same with chloreus. See the article **CHLOREUS**.

**GALE**, in the sea-language, a term of various import: when the wind blows not so hard but that a ship may carry her top-sails a-trip (that is, hoisted up to the highest) then they say it is a loom-gale. When it blows very strong, they say it is a stiff, strong, or fresh gale. When two ships are near one another at sea, and there being but little wind blowing, one of them finds more of it than the other, they say that the one ship gales away from the other.

**GALEARII**, in roman antiquity, servants who attended the soldiers in the field, and carried their helmets; whence the name.

**GALEASSE**, a large low-built vessel, using both sails and oars, and the biggest of all the vessels that make use of the latter. It may carry twenty guns, and has a stern capable of lodging a great number of marines. It has three masts, which are never to be lowered or taken down. It has also thirty-two benches of rowers, and to each bench six or seven slaves, who sit under cover. This vessel is at present only used by the Venetians.

**GALENIC**, or **GALENICAL**, in pharmacy, a manner of treating diseases founded on the principles of Galen.

The distinction of galenical and chemical, was occasioned by a division of the practitioners of medicine into two sects, which happened on the introduction of chemistry into medicine; then the chemists, arrogating to themselves every kind of merit and ability, stirred up an opposition to their pretensions, founded on the invariable adherence of the other party to the ancient practice. And though this division into the two sects of galenists and chemists has long ceased, yet the distinction of medicines, which resulted from it, is still retained.

Galenical medicines are those which are formed by the easier preparations of herbs, roots, &c. by infusion, decoction, &c. and by combining and multiplying ingredients; while those of chemistry draw their more intimate and remote virtues by means of fire and elaborate preparations, as calcination, digestion, fermentation, &c.

The late improvements in philosophy, which have retrieved the reputation of galenical pharmacy, have also greatly reformed it. It is now become all mechanical and corpuscular; and instead of qualities and degrees, every thing is now reduced to mechanical affections; to the figures, bulks, gravities, &c. of the component particles, and to the great principle of attraction.

**GALENISTS**, in church-history, a branch of anabaptists, who are said to have adopted several arian opinions concerning the divinity of our Saviour. See the articles **ARIANS** and **ANABAPTISTS**.

**GALEOBDOLON**, in botany, a name given by Dillenius, to the leonurus. See the article **LEONURUS**.

**GALEOLA**, **HEMP-LEAVED DEAD-NETTLE**, in botany, a genus of the *didynamia-gynospermia* class of plants, the flower of which is monopetalous, with the upper lip crenated and arched, and the lower one trifid: the seeds are four in number, and contained in the cup. Both the leaves and seeds of this plant are used in medicine, and said to be discutient and antiseptic.

**GALERITA**, in ichthyology, a species of blennius. See the article **BLENNIOUS**. The galerita is distinguished from the other species of blennius, by a transverse cutaneous crest on the head.

**GALEUS**,

**GALEUS**, in ichthyology, a name by which several species of sharks are called. See the article **SHARK**.

**GALEXIA**, a name used by some for the lamprey. See the article **LAMPREY**.

**GALICIA**, the most north-west province of Spain, bounded by the ocean on the north-west, by the provinces of Asturias and Leon on the east, and by Portugal on the south.

**GALICIA**, or **GUADALAJARA**, a province of Mexico, bounded by new Mexico on the north, by the gulph of Mexico on the east, by Mexico proper on the south, and by the Pacific ocean and gulph of California on the west.

**GALILE**, or **GALILEE**, once a province of Judea, now of Turkey in Asia, was bounded by mount Lebanon on the north, by the river Jordan and the sea of Galilee on the east, by the river Chifon on the south, and by the Mediterranean on the west. It was the scene of many of our Saviour's miracles.

**GALILEANS**, a sect of the Jews. Their founder was one Judas, a native of Galilee, from which place they derived their name. Their chief, esteeming it an indignity for the Jews to pay tribute to strangers, raised up his countrymen against the edict of the emperor Augustus, which had ordered a taxation or enrollment of all the subjects of the roman empire.

They pretended that God alone should be owned as master and lord; and in other respects were of the opinion of the pharisees: but, as they judged it unlawful to pray for infidel princes, they separated themselves from the rest of the Jews, and performed their sacrifices apart.

**GALIUM**, or **GALLIUM**, in botany. See the article **GALLIUM**.

**GALL**, in the animal oeconomy, the same with bile. See **BILE** and **BILIOUS**.

**GALL-BLADDER**, called *vesicula*, and *cystis fellea*, is usually of the shape of a pear, and of the size of a small hen's egg. It is situated in the concave side of the liver, and lies upon the colon, part of which it tinges with its own colour. It is composed of four membranes: or coats: the common coat; a vesicular one; a muscular one, consisting of straight, oblique, and transverse fibres; and a nervous one, of a wrinkled or reticulated surface within, and furnished with an unctuous liquor.

The use of the gall-bladder is to collect the bile, first secreted in the liver, and

mixing it with its own peculiar produce, to perfect it farther, to retain it together a certain time, and then to expel it.

**GALL**, in natural history, denotes any protuberance or tumour produced by the puncture of insects on plants and trees of different kinds.

These galls are of various forms and sizes, and no less different with regard to their internal structure. Some have only one cavity, and others a number of small cells communicating with each other. Some of them are as hard as the wood of the tree they grow on, whilst others are soft and spongy; the first being termed gall-nuts, and the latter berry-galls, or apple-galls.

The general history of galls is this: an insect of the fly-kind is instructed by nature to take care for the safety of her young, by lodging her eggs in a woody substance, where they will be defended from all injuries: she for this purpose wounds the branches of a tree; and the lacerated vessels, discharging their contents, soon form tumours about the holes thus made. The hole in each of these tumours, through which the fly has made its way, may for the most part be found; and when it is not, the maggot-inhabitant or its remains are sure to be found within, on breaking the gall. However, it is to be observed, that in those galls which contain several cells, there may be insects found in some of them, though there be a hole by which the inhabitant of another cell has escaped.

Oak-galls put, in a very small quantity, into a solution of vitriol in water, though but a very weak one, give it a purple or violet colour; which, as it grows stronger, becomes black; and on this property depends the art of making our writing-ink, as also a great deal of those of dying and dressing leather; and other manufactures.

In medicine, galls are found to be very astringent, and good, under proper management, in diarrhoeas, dysenteries, and hæmorrhages of all kinds; they have also a very eminent virtue as a febrifuge. Half a dram, or more, of the powder of Aleppo-galls may be given for a dose, and will often cure an intermittent fever. They are also used externally by way of fomentation in prociptentiæ of the anus: and a decoction of them has been injected in the fluor albus, with very great success.

**St. GALL**, in geography, a town of Switzerland, five miles west of the lake of Constance; forming a republic of itself, but without any territory. Its legislative power is lodged in two councils. It is said to contain 10,000 inhabitants, all employed in the linnen-manufacture.

**GALLANT**, or **GALANT**, a french term adopted into our language, and signifying polite, civil, and well bred, with a disposition to please, particularly the ladies. It also signifies brave or courageous.

**GALLEON**, or **GALLION**, in naval affairs. See the article **GALLION**.

**GALLERY**, in architecture, a covered place in a house, much longer than broad, and usually in the wings of a building; its use being chiefly to walk in.

**GALLERY**, in fortification, a covered walk across the ditch of a town, made of strong beams, covered over head with planks, and loaded with earth: sometimes it is covered with raw hides to defend it from the artificial fires of the besieged. Its sides should be musquet-proof. It ought to be eight foot high, and ten or twelve wide, and the covering to rise with a ridge, that what is thrown upon it by the besiegers with a design to burn it, may roll off. See plate CIX. fig. 2.

Galleries are chiefly used to secure and facilitate the miners approach to the face of the bastion, over the moat, which is already supposed to be filled up with faggots and bavins, and the artillery of the opposite flank dismounted.

**GALLERY of a mine**, is a narrow passage, or branch of a mine carried on underground to a work designed to be blown up.

Both the besiegers and the besieged also, carry on galleries in search of each others mines, and these sometimes meet and destroy each other.

**GALLERY**, in a ship, that beautiful frame, which is made in the form of a balcony, at the stern of a ship without board; into which there is a passage out of the admiral's or captain's cabin, and is for the ornament of the ship.

**GALLERY**, in gardening, a kind of covered walk, in a garden, formed into porticoes or arches, with horn-beams, lime-trees, or the like.

Each pillar of the porticoes or arches ought to be four feet distant from the other, and the gallery twelve feet high,

and ten feet wide, that there may be room for two or three persons to walk in a-breast.

In forming these galleries, it is to be observed, that when the horn-beams are grown to the height of three feet, and the distance of the pillars well regulated; the next thing to be done is; to form the frontispiece: to perform which, the horn-beam must be run up a trellace made for that purpose, which forms the arch, and as it grows up, those bows which overshoot the others, must be cut with the sheers, and in time they will grow strong, and may be kept in form by the sheers.

**GALLEY**, in naval affairs, a low-built vessel, using both sails and oars, and commonly carrying only a main-mast and fore-mast, which may be struck or lowered at pleasure. Such vessels are much used in the Mediterranean, especially by the king of France. See **SHIP**.

*Condemnation to the GALLEYS*, the punishment of being compelled to serve on board these vessels, imposed on certain criminals in France; and that either for life, or for a limited number of years, according to the nature of their crimes.

**GALLEY**, or **GALLY**, in printing. See the article **GALLY**.

**GALLI**, in antiquity, the priests of the goddess Cybele, who were eunuchs, and took their name from Gallus, a river in Phrygia.

When a youth was to be initiated into this order, the custom was to throw off his cloaths, to run crying aloud into the midst of the troop, and then drawing a sword to castrate himself; after this, he ran about the streets, carrying in his hands the marks of his mutilation, which he was to throw into a house, and in that house to put on a woman's dress.

**GALLIAMBIC VERSE**, *Galliambus*, in ancient poetry, a verse consisting of six feet, viz. an anapest, or a spondee; an iambus, or an anapest, or a tribrach; an iambus; a dactyl; a dactyl; an anapest. The word galliambus, is a compound of iambus and gallus, a priest of Cybele. These priests carried about the image of that goddess, in order to get alms, and as a part of their employment was singing verses all over the country, they, by this means, rendered poetry very despicable.

**GALLIARD**, a gay, sprightly, whimsical kind of dance, formerly much used, consisting of very different motions and actions, sometimes running smoothly along,



along, then capering, sometimes along the room, and sometimes across.

This dance was brought from Rome; from whence it was also called *romanesque*.

**GALLIARDA**, the name of a tune that belongs to a dance called a galliard.

It is commonly in triple time, of a brisk and lively humour, and something like a jig.

**GALLICAN**, any thing belonging to France: thus the term gallican church denotes the church of France, or the assembly of the clergy of that kingdom. See the article **CHURCH**.

**GALLICAN BREVIARY**, the breviary used by the church of Agregentum in Sicily: probably so called from its being introduced by St. Gerlan, who was made bishop of Agregentum after the Saracens were driven out of Sicily by earl Roger; and by the other french bishops, brought thither by norman princes.

**GALLICISM**, a mode of speech peculiar to the french language, and contrary to the rules of grammar in other languages.

**GALLINÆ**, in ornithology, an order of birds, the beak of which is conic; and somewhat incurvated, and the upper chap imbricated.

Under this order are comprehended the ostrich, peacock, pheasant, wood-cock, turkey, the common dunghill cock, partridge, &c. See the articles **OSTRICH**, **PEACOCK**, &c.

**GALLINA GUINEENSIS**, the guinea-hen. See the article **GUINEA-HEN**.

**GALLINA PISCIS**, a name given to the gurnard. See the article **GURNARD**.

**GALLINACEOUS**, an appellation given to the birds of the order of the gallinæ. See the article **GALLINÆ**.

**GALLINAGINIS CAPUT**, in anatomy. See **CAPUT GALLINAGINIS**.

**GALLINAGO**, in ornithology, a bird called in english the snipe. See **SNIPE**.

**GALLING**, or **EXCORIATION**, in medicine. See the article **EXCORIATION**.

**GALLING of a horse's back**, a disorder occasioned by heat, and the chafing or pinching of the saddle.

In order to prevent it, some take a hind's skin well garnished with hair, and fit it neatly under the pannel of the saddle, so that the hairy side may be next the horse.

When a horse's back is galled upon a journey, take out a little of the stuffing of the pannel over the swelling, and sew a piece of soft white leather on the inside

of the pannel; and anoint the part with salt butter, and every evening wipe it clean, rubbing it till it grow soft, anointing it again with butter, or for want of that, with grease: wash the swelling, or hurt, every evening with cold water and soap, and strew it with salt, which should be left on till the horse be saddled in the morning.

**GALLINULA**, in ornithology, a bird, otherwise called tringa. See **TRINGA**.

**GALLION**, or **GALLEON**, in naval affairs, a sort of ships employed in the commerce of the West-Indies. The Spaniards send annually two fleets; the one for Mexico, which they call the *flota*, and the other for Peru, which they call the gallions. See the article **FLOTA**.

By a general regulation made in Spain, it has been established, that there should be twelve men of war, and five tenders, annually fitted out for the armada or galleons; eight ships of six hundred tons burden each, and three tenders, one of an hundred tons, for the island Margarita, and two of eighty each, to follow the armada: for the New Spain fleet, two ships of six hundred tons each, and two tenders of eighty each; and for the Honduras fleet, two ships of five hundred tons each: and, in case no fleet happened to sail any year, three gallions and a tender should be sent to New Spain for the plate.

They are appointed to sail from Cadiz, in January, that they may arrive at Porto-Bello about the middle of April. where the fair being over, they may take aboard the plate, and be at Havannah with it about the middle of June, where they are joined by the *flota*, that they may return to Spain with the greater safety.

**GALLIOT**, a small gally designed only for chace, carrying only one mast, and two or three pattereroes; it can both sail and row, and has sixteen or twenty oars. All the seamen on board are soldiers, and each has a musket by him on quitting his oar.

**GALLIPAGO-ISLANDS**, are situated in the Pacific Ocean on both sides the equator, between 85° and 90°, west long. and about four hundred miles west of Peru.

**GALLIPOLI**, a port-town of european Turkey, situated at the entrance of the Propontis, or Sea of Marmora, about 100 miles south west of Constantinople: east long. 28°, and north lat. 40° 45'.

**GALLIPOLI** is also a port town of the kingdom of Naples, situated on the gulph of Otranto, about twenty-three miles west of that city: east long.  $19^{\circ}$ , and north lat.  $40^{\circ} 25'$ .

**GALLIUM**, *LADIES-BEDSTRAW*, in botany, a genus of the *tetrandria-monogynia* class of plants, the flower of which is a quadrifid single petal, without any tube, and placed flatwise: the fruit consists of two globose bodies, growing close together, but not adhering, and containing each a single kidney-shaped seed. It is said to be an excellent astringent.

**GALLO**, an island in the pacific ocean near the coast of Peru, about 200 miles west of Popayan: west long.  $80^{\circ}$ , and north lat.  $2^{\circ} 15'$ .

**GALLO** is also a town of Italy, ten miles south of Ancona.

**GALLO**, or **PUNTO GALLO**, a sea-port of Ceylon, subject to the Dutch: east long.  $78^{\circ}$ , and north lat.  $6^{\circ}$ .

**GALLON**, a measure of capacity both for dry and liquid things, containing four quarts; but these quarts, and consequently the gallon itself, are different, according to the quality of the thing measured: for instance, the wine gallon contains 231 cubic inches, and holds eight pounds averdupois, of pure water: the beer and ale gallon contain 282 solid inches, and holds ten pounds three ounces and a quarter averdupois, of water: and the gallon for corn, meal, &c.  $272\frac{1}{4}$  cubic inches, and holds nine pounds thirteen ounces of pure water.

**GALLOON**, in commerce, a narrow thick kind of ferret, or lace, used to edge or border cloaths, sometimes made of wool, and at others of gold or silver.

**GALLOP**, in the manege, a motion of a horse that runs at full speed, in which making a kind of leap forwards, he lifts both his fore-legs almost at the same time; when these are in the air, just upon the point of touching the ground, he lifts both his hind-legs almost at once.

A horse in galloping forwards, may lead with which fore-leg he pleases, tho' horses do it most commonly with their right fore-leg; but with whatever fore-leg they lead, the hind-leg of the same side must follow it, otherwise their legs are said to be disunited. To remedy this disorder, the rider must stay the horse a little upon the hand, and give

him the spur on the contrary side to that in which he is disunited.

In a circle, a horse is always to lead with the fore-leg, within the turn; otherwise he is said to gallop false; but here too, the hind-leg of the same side must follow.

**GALLOPADE**, in the manege, also termed the fine gallopade, the short gallop, the listening gallop, and the gallop of the school, is a hand-gallop, in which a horse galloping upon one or two treads, is well united, well knit together, and well coupled. Hence it is said, that a horse makes a gallopade, and works with one haunch; that is, instead of going upon one tread, whether right-out, or in a circle, he has one haunch kept in subjection, let the turn or change of the hand be what it will; so that the inner haunch, which looks to the center of the ground is more narrowed, and comes nearer to the center than the shoulder; and thus the horse does not go altogether to that side, and his way of working is a little more than one tread, and somewhat less than two.

**GALLOPAVO**, in zoology, the same with pavo, or the peacock. See the article **PEACOCK**.

**GALLOWAY**, a province of Scotland, which gives the title of earl to a branch of the noble family of Stuart.

It is divided into two districts; the western, called Upper Galloway, being the same with Wigtonshire; and the eastern, or stewartry of Kircudbright, called Lower Galloway.

**GALLOWAY** is also the capital of a county of the same name, in the province of Connaught, in Ireland: west long.  $9^{\circ} 12'$ , and north lat.  $53^{\circ} 12'$ .

It has a good port, and is advantageously situated for a foreign trade.

**New-GALLOWAY**, a borough-town of Scotland, in the county of Wigton, with which, and some other boroughs, it classes.

**GALLOWS**, an instrument of punishment, on which persons convicted of felony, &c. are executed by hanging. It is formed of two pieces of timber fixed in the earth, with a beam fastened to each on the top; or with three pieces of timber fixed in the earth, with three pieces on the top, forming a triangle.

**GALLOWs of a plough**, a part of the plough-head, so called by farmers, from its resemblance to the common gallows, as consisting

consisting of three pieces of timber, whereof one is placed transversely over the heads of the other two. See the article **PLOUGH**.

**GALLS**, in natural history. See **GALL**.

*Harness*-**GALLS**, among farriers. See the article **HARNESS**.

**GALLUS**, the **COCK**, in ornithology, a well-known domestic fowl, the head of which is ornamented with a longitudinal fleshy crest, or comb: the wattles are two, and placed longitudinally on the throat. This, in its natural state, is a very robust and beautiful bird, variegated with a great number of elegant colours. See plate CX. fig. 1. where n° 1. represents the common dunghill-cock, and n° 2. the hen.

**GALLUS MARINUS**, a name very improperly used by some authors for two distinct kinds of fish, the *faber* and *orbis*. See the articles **FABER** and **ORBIS**.

**GALLY**, in printing, a frame into which the compositor empties the lines out of his composing-stick, and in which he ties up the page when it is completed. The gally is formed of an oblong square board, with a ledge on three sides, and a groove to admit a false bottom, called a gally-slice.

**GALLY**, in the sea-language, is a place in the cook-room, where the grates are set up, and in which fires are made for roasting or boiling the victuals.

**GALLY-WORM**, in zoology, the english name of the *julus* of authors. See the article **JULUS**.

**GAMBEZON**, or **GAMBA**, in antiquity, a kind of soft quilted waistcoat, worn under the coat of mail to prevent its hurting the body. It was made of wool or cotton, quilted between two stuffs, and was also called counterpoint.

**GAMBIA**, a great river of Africa, which, running from east to west falls into the Atlantic ocean in 14° north lat. and 15° west long.

It is said to be navigable for sloops 600 miles. About ten leagues up this river is James's Island, a settlement belonging to Great Britain: it is very small, being less than a mile in circumference, but is defended by a fort.

**GAMBOGE**, is a concreted vegetable juice, the produce of two trees, both called by the Indians *caracapulli*, and is partly of a gummy, and partly of a resinous nature. It is brought to us either in form of orbicular masses, or of cylindrical rolls of various sizes; and is of

a dense, compact, and firm texture, and of a beautiful yellow. It is chiefly brought to us from Cambaja, in the East-Indies, called also Cambodja, and Cambogia; and from thence it has obtained its names of cambadium, cambogium, and gambogium.

It is a very rough and strong purge; it operates both by vomit and stool, and both ways with much violence, almost in the instant in which it is swallowed; but yet without griping. It requires caution and judgment in administering it; but those who know how to give it properly, find it an excellent remedy in dropsies, cachexies, jaundice, asthmas, catarrhs, and in the worst cutaneous eruptions.

Its dose is from two or three grains to six, eight, or ten: four grains generally operate briskly without vomiting, and eight or ten grains usually vomit briskly, and afterwards purge downwards.

It is at present much more esteemed by painters in water-colours, than by physicians. *Hill's Mat. Med.*

**GAME**, *ludus*, in general, signifies any diversion, or sport, that is performed with regularity, and restrained to certain rules. See the article **GAMING**.

Games are usually distinguished into those of exercise and address, and those of hazard. To the first belong chess, tennis, billiards, wrestling, &c. and to the latter those performed with cards or dice, as back-gammon, ombre, picquet, whist, &c. See the articles **CHESS**, **BACK-GAMMON**, &c.

**GAMES**, *ludi*, in antiquity, were public diversions, exhibited on solemn occasions. Such, among the Greeks, were the olympic, pythian, isthmian, nemæan, &c. games; and, among the Romans, the apollinarian, circenian, capitoline, &c. games. See the articles **OLYMPIC**, **PYTHIAN**, &c.

It was also customary, among the Greeks, for persons of quality to institute games, with all sorts of exercises, as running, wrestling, boxing, &c. at the funerals of their friends, to do them honour, and render their death more remarkable. This practice is frequently mentioned by antient writers, as Miltiades's funeral in Herodotus, Brasidas's in Thucydides, Timoleon's in Plutarch, with many more. Nor was this custom peculiar to later ages, since we find the description of Patroclus's funeral games takes up the greatest part of one of Homer's iliads; and even prior to this, Oedipus's funeral

is said to have been solemnized with sports.

Among the Romans, there were three sorts of games, *viz.* sacred, honorary, and ludicrous. The first were instituted immediately in honour of some deity or hero; of which kind were those already mentioned, together with the *augustales*, *florales*, *palatini*, &c. The second class were those exhibited by private persons, at their own expence, in order to please the people, and to ingratiate themselves with them, to make way for their own preferment: such were the combats of gladiators, the scenic games, and other amphitheatrical sports. The ludicrous games were much of the same nature with the games of exercise and hazard among us: such were the *ludus trojanus*, *tesseræ*, *tali*, *trochus*, &c. See the article TROJAN GAME, &c.

By a decree of the roman senate, it was enacted, that the public games should be consecrated, and united with the worship of the gods as a part thereof; whence it appears, that feasts, sacrifices, and games, made up the greatest part, or rather the whole, of the external worship offered by the Romans to their deities.

Others distinguish the roman games into 1. The equestrian, or curule games, which were the same with the circensian. 2. The gymnical games, wherein were exhibited gladiatorial, and other shews of the like nature: these were sacred to Mars and Minerva. 3. The theatrical entertainments, consisting of tragedies, comedies, balls, &c. these were sacred to Apollo, Bacchus, Minerva, Venus, &c.

**GAME**, in law, signifies birds or prey, taken or killed by fowling, or hunting. There are several statutes for punishing offences committed by persons not qualified by law, to take or destroy the game. The antient laws ordain, that no person shall take pheasants or partridges, with engines in another's ground, without his license, on forfeiture of 10*l.* and persons killing any pheasant, partridge, pigeon, duck, hare, or other game, forfeit 20*s.* for every fowl, hare, &c. 11 Hen. VII. 1 Jac. I. c. 17. Constables having a justice of peace's warrant, may search the houses of suspected persons for game; and in case any be there found, and they do not give a good account how they came by it, such persons shall forfeit for each hare or pheasant, partridge, &c. not under 5*s.* nor exceeding 20*s.* Likewise by another statute, if any

higher, chapman, carrier, inn-keeper, or victualler, shall have in his custody any hares, pheasants, partridges, heath-game, &c. he forfeits for every hare and fowl, 5*l.* unless the same be sent by a person qualified to kill game. The selling or offering game to sale is made liable to the like penalty; and in that case, if any hare, &c. be found in a shop, &c. it is deemed exposing it to sale. Persons not qualified, keeping dogs, nets, or engines to kill game, on their conviction before a justice of peace, shall also pay 5*l.* or be sent to the house of correction for three months, 4 and 5 W. and M. c. 23. 5 Ann. c. 14. 9 Ann. The penalties for destroying game, are recoverable by action, as well as before justices of peace, by 8 Geo. I. c. 19. If a person hunts any game on the land of another, such other cannot justify the killing of his dogs. Where one in hunting starts a hare upon his own land, and then follows and kills such hare in another person's ground, it is lawful, and the game is his own; but where a man starts a hare on another's land, and kills it there, he is subject to an action of trespass.

**GAME-COCK**, a fighting cock, or one kept for sport; in the choice of which, four things are chiefly to be regarded, *viz.* shape, colour, courage, and sharp heel.

1. As to shape, a game-cock must not be chosen either too large, nor too small: the first being generally unweildy, and unactive; the other weak and tedious in fighting. The middle-sized cock is therefore most proper for this purpose, as being strong, nimble, and easily matched; his head ought to be small, with a quick large eye, and a strong beak, which should be crooked, and in colour suitable to the plume of his feathers; the beam of his leg should be strong, and of the colour of his plume; his spurs should be rough, long and sharp; a little bending, and pointing inward. 2. The best colour for a game-cock is either that of a grey, yellow, or red: the pyed pile may pass indifferently; but the white and dun are rarely known to be good for any thing. If his neck be invested with a scarlet complexion, it is a sign of his being strong, lusty, and courageous: whereas a pale and wan complexion denotes him faint and unhealthy. 3. His courage may be known by his proud, upright standing, and  
stately

stately tread in walking; and if he crows frequently in the pen, it is a proof of spirit. 4. His sharpness of heel is known only from observation in fighting; that is, when at every rising he hits to that he draws blood from his adversary; gilding his spurs continually, and at every blow threatening him with immediate death.

To prepare a cock to fight; 1. With a pair of fine shears, cut all his mane off, close to his neck, from the head to the setting of the shoulders. 2. Clip off all the feathers from the tail close to his rump, and the redder it appears, the better is the cock in condition. 3. Spread his wings by the length of the first rising feather; and cut off the rest slope-wise, with sharp points, that in his rising he may therewith endanger an eye of his adversary. 4. Scrape smooth and sharpen his spurs with a pen-knife: and, lastly, see that there be no feathers on the crown of his head, for his opponent to take hold of; and moisten his head all over with your spittle.

**GAME-HEN**, should be of a black, brown, speckled grey, grizzle, or yellow colour: being tufted on the crown denotes courage and resolution; and having the addition of weapons, conduces very much to her excellency. Her body should be big and well poked behind, for the production of large eggs. A general remark is, that a right hen of the game, from a dung-hill cock, will bring forth very good chickens: but the best game cock from a dunghill hen, will never get a bird fit for the game. See the articles **BREEDING**, **HATCHING**, and **CHICKEN**.

**GAME-KEEPERS**, are those who have the care of keeping and preserving the game, and are appointed to that office by lords of manors, &c. who not being under the degree of esquire, may, by a writing under their hands and seals, authorize one or more game-keepers, who may seize guns, dogs or nets used by unqualified persons for destroying the game. Game-keepers are also to be persons either qualified by law to kill the game, or to be truly and properly the servants of the lords or ladies of manors appointing them; and no game-keeper can qualify any person to such end, or to keep dogs, &c. 5 Ann. c. 14. 9 Ann. c. 25. 3 Geo. I. c. 11. The persons qualified to keep guns, dogs, &c. are those who have a free

warren, or 100 l. a year by inheritance, or for life, or a lease for ninety-nine years of 150 l. per annum, also the eldest sons of esquires, &c. 22 and 23 Car. II. c. 25.

A lord of a manor may appoint a game-keeper within his manor and royalty to kill hares, pheasants, partridges, &c. for his own use, the name of whom is to be entered with the clerk of the peace of the county; and if any other game-keeper, or one legally authorized, under colour of his authority, kills game, and afterwards sells it, without the consent of the person that impowers him, he is on conviction to suffer corporal punishment.

**GAMELIA**, γαμηλια, in grecian antiquity, a nuptial feast, or rather sacrifice, held in the antient greek families on the day before a marriage; thus called, from a custom they had of shaving themselves on this occasion, and presenting their hair to some deity to whom they had particular obligations.

**GAMELION**, a poem, or composition in verse on the subject of a marriage, commonly called an epithalamium. See the article **EPITHALAMIUM**.

**GAMELION**, in antient chronology, was the eight month of the Athenian year, containing twenty-nine days, and answering to the latter part of our January, and beginning of February. It was thus called, as being, in the opinion of the Athenians, the most proper season of the year for marriage.

**GAMETRIA**, or **GEMATRIA**. See the article **GEMATRIA**.

**GAMING**, the art of playing or practicing any game, particularly those of hazard, as cards, dice, tables, &c.

Gaming has, at all times, been looked on as a thing of pernicious consequence to the common-wealth; and is, therefore, severely prohibited by law. The statute 33 Hen. VIII. gives justices of peace, and head officers in corporations, a power to enter all houses suspected of unlawful games; and to arrest the gamesters, till they give security not to play for the future. Persons keeping any unlawful gaming-house, are fined 40 s. and the gamesters 6 s. 8 d. a time. If any persons by fraud, deceit, or unlawf I device, in playing either at cards or dice, tables, bowls, cock-fighting, horse-races, foot-races, &c. or bearing a share in the stakes, or betting, shall win any money or valuable thing of another, he shall forfeit

forfeit treble the value thereof : likewise if any person shall play at any of the said games upon tick, and not for ready money, and lose the sum of 100l. on credit, at any one meeting, if the money be not paid down, his security taken for it shall be void, and the winner becomes liable to a forfeiture of treble value of such money won. 16 Car. II. c. 7. Not only all notes, bills, bonds, mortgages, or other securities given for money won at gaming, are declared void ; but also where lands are granted, they shall go to the next person intitled, after the decease of the person so incumbering the same : persons losing by gaming at one time 10l. may recover the money lost, from the winner, by an action of debt brought within three months ; and on the loser's not prosecuting, any other person may lawfully do it, and recover treble the value, with costs. 9 Ann. c. 14. Those who cheat at cards, dice, &c. besides their forfeitures, have inflicted on them such infamy and corporal punishment, as in cases of perjury ; and beating or challenging any other person to fight, on account of money won by gaming, shall forfeit all their goods, and be imprisoned two years : and where persons play that have no visible estates, and do not make it appear that the principal part of their maintenance is got by other means than gaming, they may be bound to their good behaviour by two justices of the peace, &c. Stat. *ibid.* See 2 Geo. II. c. 28. The ace of hearts, pharaoh, basket, and hazard, are judged to be lotteries by cards or dice ; and persons who set up those games, are subject to 200l. penalty. And every adventurer, who shall play, stake, or punt at them, forfeits 50l. Also any sales of houses, goods, plate, &c. in such a way, are void, and the things forfeited to any who will sue for the same. 12 Geo. II. c. 28.

*Laws of GAMING.* These are founded on the doctrine of chances. See the article CHANCE.

Mr. de Moivre, in a treatise de Mensura Sortis, has computed the variety of chances in several cases that occur in gaming, the laws of which may be understood by what follows.

Suppose  $p$  the number of cases in which an event may happen, and  $q$  the number of cases wherein it may not happen, both sides have the degree of probability, which is to each other as  $p$  to  $q$ .

If two gamblers, A and B, engage on this footing, that, if the cases  $p$  happen, A shall win ; but, if  $q$  happen, B shall win, and the stake be  $a$  ; the chance of A

will be  $\frac{pa}{p+q}$ , and that of B  $\frac{qa}{p+q}$  ; conse-

quently, if they sell the expectancies, they should have that for them respectively.

If A and B play with a single die, on this condition, that, if A throw two or more aces at eight throws, he shall win ; otherwise B shall win ; what is the ratio of their chances ? Since there is but one case wherein an ace may turn up, and five wherein it may not, let  $a=1$ , and  $b=5$ . And, again, since there are eight throws of the die, let  $n=8$  ; and you will have  $a+b^n-b^n-nab^{n-1}$ , to  $b^n+nab^{n-1}$  : that is, the chance of A will be to that of B, as 663991 to 10156525, or nearly as 2 to 3.

A and B are engaged at single quoits, and, after playing some time, A wants 4 of being up, and B 6 ; but B is so much the better gamester, that his chance against A upon a single throw would be as 3 to 2 ; what is the ratio of their chances ? Since A wants 4, and B 6, the game will be ended at nine throws ; therefore, raise  $a+b$  to the ninth power, and it will be  $a^9+9a^8b+36a^7bb+84a^6b^3+126a^5b^4+126a^4b^5$ , to  $84a^3b^6+36aa^2b^7+6ab^3+b^9$  ; call  $a$  3, and  $b$  2, and you will have the ratio of chances in numbers, *viz.* 1759077 to 194048.

A and B play at single quoits, and A is the best gamester, so that he can give B 2 in 3, what is the ratio of their chances at a single throw ? Suppose the chances as 2 to 1, and raise  $2+1$  to its cube, which will be  $2^3+32^2+32+1$ . Now since A could give B 2 out of 3, A might undertake to win three throws running ; and, consequently, the chances in this case will be as  $2^3$  to  $32^2+32+1$ . Hence  $2^3=32^2+32+1$  ; or,  $22^3=2^3+32^2+32+1$ . And, therefore,  $2\sqrt[3]{2}=2+1$  ;

and, consequently,  $2=\frac{1}{\sqrt[3]{2}-1}$ . The

chances, therefore, are  $\frac{1}{\sqrt[3]{2}-1}$ , and 1, respectively.

Again, suppose I have two wagers depending, in the first of which I have 3 to 2 the best of the lay, and in the second 7 to 4, what is the probability I win both wagers ?

1. The probability of winning the first is  $\frac{3}{5}$ , that

that is the number of chances I have to win, divided by the number of all the chances: the probability of winning the second is  $\frac{7}{11}$ : therefore, multiplying these two fractions together, the product will be  $\frac{2}{33}$ , which is the probability of winning both wagers. Now, this fraction being subtracted from 1, the remainder is  $\frac{31}{33}$ , which is the probability I do not win both wagers: therefore the odds against me are 34 to 21.

2. If I would know what the probability is of winning the first, and losing the second, I argue thus: the probability of winning the first is  $\frac{1}{3}$ , the probability of losing the second is  $\frac{4}{7}$ : therefore multiplying  $\frac{1}{3}$  by  $\frac{4}{7}$ , the product  $\frac{4}{21}$  will be the probability of my winning the first, and losing the second; which being subtracted from 1, there will remain  $\frac{17}{21}$ , which is the probability I do not win the first, and at the same time lose the second.

3. If I would know what the probability is of winning the second, and at the same time losing the first, I say thus: the probability of winning the second is  $\frac{7}{11}$ ; the probability of losing the first is  $\frac{2}{3}$ : therefore, multiplying these two fractions together, the product  $\frac{14}{33}$  is the probability I win the second, and also lose the first.

4. If I would know what the probability is of losing both wagers, I say, the probability of losing the first is  $\frac{2}{3}$ , and the probability of losing the second  $\frac{4}{7}$ : therefore, the probability of losing them both is  $\frac{8}{21}$ ; which being subtracted from 1, there remains  $\frac{13}{21}$ : therefore, the odds of losing both wagers is 47 to 8.

This way of reasoning is applicable to the happening or failing of any events that may fall under consideration. Thus if I would know what the probability is of missing an ace four times together with a die, this I consider as the failing of four different events. Now the probability of missing the first is  $\frac{5}{6}$ , the second is also  $\frac{5}{6}$ , the third  $\frac{5}{6}$ , and the fourth  $\frac{5}{6}$ : therefore the probability of missing it four times together is  $\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{625}{1296}$ ; which being subtracted from 1, there will remain  $\frac{671}{1296}$  for the probability of throwing it once or oftener in four times: therefore the odds of throwing an ace in four times, is 671 to 625.

But if the flinging of an ace was undertaken in three times, the probability of

missing it three times would be  $\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{125}{216}$ ; which being subtracted from 1, there will remain  $\frac{91}{216}$  for the probability of throwing it once or oftener in three times: therefore the odds against throwing it in three times are 125 to 91. Again, suppose we would know the probability of throwing an ace once in four times, and no more: since the probability of throwing it the first time is  $\frac{1}{6}$ , and of missing it the other three times is  $\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6}$ , it follows that the probability of throwing it the first time, and missing it the other three successive times, is  $\frac{1}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{125}{1296}$ ; but because it is possible to hit it every throw as well as the first, it follows, that the probability of throwing it once in four throws, and missing the other three, is  $\frac{4 \times 125}{1296} = \frac{500}{1296}$ ; which

being subtracted from 1, there will remain  $\frac{796}{1296}$  for the probability of throwing it once, and no more, in four times. Therefore, if one undertake to throw an ace once, and no more, in four times, he has 500 to 796 the worst of the lay, or 5 to 8 very near.

Suppose two events are such, that one of them has twice as many chances to come up as the other; what is the probability that the event, which has the greater number of chances to come up, does not happen twice before the other happens once, which is the case of flinging 7 with two dice before 4 once? Since the number of chances are as 2 to 1, the probability of the first happening before the second is  $\frac{2}{3}$ , but the probability of its happening twice before it, is but  $\frac{2}{3} \times \frac{2}{3}$  or  $\frac{4}{9}$ : therefore it is 5 to 4 (even does not come up twice before four once).

But, if it were demanded; what must be the proportion of the facilities of the coming up of two events, to make that which has the most chances come up twice, before the other comes up once? The answer is 12 to 5 very nearly: whence it follows, that the probability of throwing the first before the second is  $\frac{12}{17}$ , and the probability of throwing it twice is  $\frac{12}{17} \times \frac{12}{17}$ , or  $\frac{144}{289}$ ; therefore, the probability of not doing it is  $\frac{145}{289}$ : therefore the odds against it are as 145 to 144, which comes very near an equality.

Suppose there is a heap of thirteen cards of one colour, and another heap of thirteen cards of another colour, what is the pro-

probability that, taking one card at a venture out of each heap, I shall take out the two aces?

The probability of taking the ace out of the first heap is  $\frac{1}{13}$ , the probability of taking the ace out of the second heap is  $\frac{1}{13}$ ; therefore the probability of taking out both aces is  $\frac{1}{13} \times \frac{1}{13} = \frac{1}{169}$ , which being subtracted from 1; there will remain  $\frac{168}{169}$ : therefore the odds against me are 168 to 1.

In cases where the events depend on one another, the manner of arguing is somewhat altered. Thus, suppose that out of one single heap of thirteen cards of one colour I should undertake to take out first the ace; and, secondly, the two: though the probability of taking out the ace be  $\frac{1}{13}$ , and the probability of taking out the two be likewise  $\frac{1}{13}$ ; yet, the ace being supposed as taken out already, there will remain only twelve cards in the heap, which will make the probability of taking out the two to be  $\frac{1}{12}$ ; therefore the probability of taking out the ace, and then the two, will be  $\frac{1}{13} \times \frac{1}{12}$ .

In this last question the two events have a dependence on each other, which consists in this, that one of the events being supposed as having happened, the probability of the other's happening is thereby altered. But the case is not so in the two heaps of cards.

If the events in question be  $n$  in number, and be such as have the same number  $a$  of chances by which they may happen, and likewise the same number  $b$  of chances by which they may fail, raise  $a+b$  to the power  $n$ . And if A and B play together, on condition that if either one or more of the events in question happen, A shall win, and B lose, the probability of A's winning will be  $\frac{a+b)^n - b^n}{a+b)^n}$ ; and

that of B's winning will be  $\frac{b^n}{a+b)^n}$ ; for

when  $a+b$  is actually raised to the power  $n$ , the only term in which  $a$  does not occur is the last  $b^n$ : therefore, all the terms but the last are favourable to A.

Thus if  $n=3$ , raising  $a+b$  to the cube  $a^3 + 3a^2b + 3ab^2 + b^3$ , all the terms but  $b^3$  will be favourable to A; and therefore the probability of A's winning will be

$\frac{a^3 + 3a^2b + 3ab^2}{a+b)^3}$ , or  $\frac{a+b)^3 - b^3}{a+b)^3}$ ; and

the probability of B's winning will be  $\frac{b^3}{a+b)^3}$ . But if A and B play on condition, that if either two or more of the events in question happen, A shall win; but in case one only happen, or none, B shall win; the probability of A's winning will be  $\frac{a+b)^n - nab^{n-1} - b^n}{n+b)^n}$ ; for

the only two terms in which  $aa$  does not occur, are the two last, viz.  $nab^{n-1}$  and  $b^n$ .

**GAMMA AUREUM**, in zoology; a species of the phalenæ, or moths, with deflected wings. See **PHALENA**.

**GAMMARUS**, in ichthyology, a species of the cancer, or crab-fish. See the article **CANCER**.

**GAMMER-LAMB**, or **GIMMER-LAMB**. See the article **GIMMER**.

**GAMMONING**, among seamen, denotes several turns of rope taken round the bowsprit, and reeved through holes in knees of the head, for the greater security of the bowsprit. *Blackley*.

**GAMMUT**, **GAM**, **GAMMA**, or **GAMMA-UT**, in music, a scale whereon we learn to sound the musical notes, *ut, re, mi, fa, sol, la*, in their several orders and dispositions. See **NOTE** and **SCALE**.

The invention of this scale is owing to Guido Aretine; tho' it is not so properly an invention as an improvement on the diagram, or scale of the Grecians. See the article **DIAGRAM**.

The gammut is also called the harmonical hand, by reason that Guido made first use of the figure of the hand to demonstrate the progression of his sounds.

Guido, finding the diagram of the antients of too small an extent, added five more chords or notes to it; one below the proslambanomenos of the antients, and four above the nete hyperbolæon. The first he called hypo-proslambanomenos, and denoted it by the letter G, or the greek  $\gamma$ , gamma; which note being at the head of the scale, occasioned the whole scale to be called by the name of gam, or gammut. This scale is divided into three series or columns, the first called durum, the second natural, and the third molle, as represented by the following scheme. See **PROSLAMBANOMENOS**, **NETE**, **DURUM**, **NATURAL**, and **MOLLE**.

The



## The GAMMUT or SCALE of GUIDO.

	ee di	B. dur la	Nat. mi	Molle la
	cc bb	sol fa	re ut	sol la
G	aa	re	la	fa mi
	g	ut	sol	re
	f	la	fa	ut
	e	la	mi	
F	d	sol	re	la
	e	fa	ut	sol
	b	mi		fa
	a	re	la	mi
	G	ut	sol	re
	f	ut	fa	ut
	e	la	mi	
C	d	sol	re	
	c	fa	ut	
	B	mi		
	a	re		
	Γ	ut		

The use of this scale is to make the passages and transitions from B durum to B molle, by means of tones and semitones. The series of B natural standing between the other two, communicates with both, so that to name the chord of the scale by these syllables, if we would have the semitones in their natural places, viz. *b, c,* and *e, f,* then we apply *ut* to *g*; and after *la* we go into the series of B natural, at *fa*; and after the *la* of this, we return to the former at *mi*; and so on. And we may begin at *ut* in *c*, and pass into the first series at *mi*, and then back to the other at *fa*, by which means the one transition is a semitone, viz. *la, fa,* and the other a tone, *la, mi*. To follow the order of B molle, we may begin with *ut* in *c* or *f*, and make each semitone after the same manner. See the articles TONE and SEMITONE.

Hence came the barbarous names of ga-

mut, are, B mi, &c. but what perplexed work is here with so many different syllables applied to each chord, and all to mark the places of the semitones, which the simple letters *a, b, c,* &c. do as well, and with more ease.

Several alterations have been made in the gammut. M. Je Murs particularly added a seventh syllable, viz. *fi*; and the English usually throw out that and *ut*, and make the other serve for all, as will be shewn under the article SOLFAING.

GAMMUT, or GAMM, is also the first or gravest note in the modern scale of music, the reason whereof is shewn under the preceding article.

GANDER, in ornithology, the male of the goose-kind; one of which, it is said, will serve five geese. See GOOSE.

GANG, in the sea-language, the same with crew. See the article CREW.

The company wherewith a ship's boat is manned,

manned, is called the cockswain's crew, or gang. See the article COCKSWAIN.

**GANG-WAY** is the several passages or ways from one part of the ship to the other; and whatever is laid in any of those passages, is said to lie in the gang-way.

**GANG-FISH**, a species of coregonus, with the upper jaw longest and flat, and with fourteen rays in the back fin. See the article COREGONUS.

**GANGEA**, the capital of a territory in the province of Chirvan, in Persia: east long. 46°, north lat. 41°.

**GANGES**, a large river of the hither India, rises in the mountains which separate India from Tartary; and, running from the north-west to the south-east near 1500 miles through the Mogul's dominions, discharges itself by several channels into the bay of Bengal.

This river is worshiped like a god by the superstitious Indians, many thousands of whom annually undertake pilgrimages to it, and carry their dying friends to expire on its banks, and as soon as they die, heave them into the middle of it.

**GANGI**, or **COULER**, a town of Golconda, in the hither India: east long. 79°, and north lat. 16°.

**GANGLIO**, or **GANGLION**, in surgery, a hard tubercle, generally moveable, in the external or internal part of the carpus; upon the tendons or ligaments in that part, usually without any pain to the patient. Though ganglions so nearly resemble an encysted tumour, that Celsus makes them one and the same; yet their difference may appear, if it were only from their different seats; ganglions being confined to the tendons and ligaments of the hands and feet, whereas encysted tumours are not restrained to any part of the body. See the article ENCYSTED.

With regard to the cause of ganglions, they seem generally to proceed from an inspissation of the viscid juices, which are let out, and lodged betwixt the fibres and membranes, when the tendons and ligaments of those parts have been injured by a fall, blow, strain, contusion, or the like, in which case they gradually increase more or less, as long as the fibres yield; the juices find vent so as to advance to the size of a filbert, walnut, or even a pigeon's egg: some are oblong, round, or oval, with an equal or uneven surface: some of them which are recent, may be easily dispersed; and others, which have

been of long standing, hardly yield to any remedies but the knife.

The inspissated matter of a recent ganglion, may often be happily dispersed by barely rubbing the tumour well every morning with the fasting saliva, and binding a plate of lead on it afterwards for several weeks successively. Many attribute a greater discutient virtue to the lead, when it has first had some mercury rubbed on it. Forelius, and others, advise the use of a plaster of ammoniac and mercury, and often to rub them with oil of sassa. Others write, that a cure may be readily performed, if the patient lays his hand upon a table, and strikes on the tumour with his fist: but care should be taken not to injure the bones, tendons, or other parts of the hand in striking the tumour; and the same care must be taken if there is a necessity of having recourse to caustics or incision, in order to remove them.

See CAUSTIC and INCISION.

**GANGRENE**, a very great and dangerous degree of inflammation, wherein the parts affected begin to corrupt, and put on a state of putrefaction. A gangrene is distinguished from a sphacelus, in as much as this latter is not an incipient but an absolute and perfect corruption, or death of the parts, already made. See the article SPHACELUS.

A gangrene may be discovered generally from the following signs; namely, the inflammation, with its symptoms, which have all along been very violent, do generally undergo a sudden change, as if they were going off. The parts which were before swelled and tense, do now grow soft and flaccid, and upon pressing with the finger on the skin and fat, its impression remains behind, as in an oedema; at length the cuticula separates from the cutis, often rising up in blisters, like those on burns, filled with a reddish, yellowish, and black humour; and the sense of the limb is in some degree diminished. See the article OEDEMA.

The causes of a gangrene, as well as a sphacelus, are either external or internal. Among the internal causes are reckoned an erysipelas, and all other inflammations which rise spontaneously, and can by no means be dispersed, nor brought to suppuration. Inflammations of this kind usually proceed from the blood's being too acrimonious, or corrupted by the bile, or in a scorbutus; or when the circulation of the blood is too quick, or too slow,

by

by reason of old age, or any other weakness; or, lastly, when the patient uses a perverse course of life with respect to diet, and passions of the mind, especially anger, grief, and fear, during the time of the inflammation. By external causes are intended injuries of the air, cold water, and the application of topical remedies externally to the inflamed parts; which are either cooling, astringent, fat, oily, or the like; together with all great external hurts or accidents, which frequently happen to the body through falls, blows, &c. as in wounds, fractures, luxations, &c. See WOUND, FRACTURE, and LUXATION.

A gangrene is for the generality never without danger, because it easily changes into a sphacelus, or intire mortification, which never admits of cure but by taking off the dead parts. But a gangrene which is slight, incipient, and not spread far, but only affects the skin and fat, is not very difficult to cure; especially when it happens in a young and stout patient, in a mild and temperate season, and does little or no injury to the muscles and nerves: but the larger, more violent, and confirmed is the gangrene, and the faster it spreads, the more difficult it is generally to effect a cure, especially in an old or weak patient; or in an ill habit of body, from a dropy, phthisis, or scorbutus: the weather also being too hot, or very cold, or the parts affected being near the thorax, or abdomen, may make the case more dangerous. Nor can this case be neglected without the utmost danger of life, or its suddenly turning into a sphacelus.

Therefore the gangrene must be treated so, that it may not terminate in a sphacelus. For which end, first of all, in plethoric and strong habits, the patient must be bled largely, and the operation repeated at discretion; but in weak habits, it should be omitted. The remainder of the treatment, according to Heister, will consist chiefly in observing the following directions. 1. To be careful in the beginning to prevent all violent external causes of inflammations, too strict a bandage in wounds and fractures, all foreign bodies which are stuck in the part, as thorns, splinters, &c. improper medicines externally applied, as ointments, oils, and plasters, with cooling and astringent things; all which should be removed as soon as possible. 2. The next observation respects chiefly the keep-

ing up the patient's strength, especially in weak and old people. This may be best effected by ordering a diet which not only affords good juices, but is also well accommodated to the age, constitution, and other circumstances of the patient. In weak and old people, the most suitable diet will be soups, strengthening broths, &c. With respect to medicines, the most proper are the corroborants, usually termed cordials, as the spirits, essences, powders, and electuaries of that tribe; especially made up or mixed with confectioned alkermes. It will be proper also, in this case, frequently to apply a sponge to the nose or carpal arteries, which has been dipped in hungary water; also to bind it to the temples. For patients who are of a more warm, sanguine, and bilious habit, soups and ptisans mixed with acid juice of citrons or lemons, will be very proper strengtheners; at the same time, not neglecting other medicines, which are proper to be used in fevers: but the peruvian bark is by many celebrated in this disorder beyond any other internal medicine. 3. The chief and last observation concerning the treatment of a gangrene, is chiefly to discharge the stagnating and corrupted blood from the parts affected as soon as possible, to prevent the neighbouring parts from being affected thereby.

The principal means to effect this are, 1. To make use of proper internal, strengthening medicines. 2. To make scarifications on the part affected, by numerous incisions lengthways, and of a sufficient depth, in order to discharge the stagnating and corrupted blood, and to make way for the ingress of the virtues of the discutient medicines which are applied externally. Lastly, 3. Discutient, stimulating, and balsamic fomentations and cataplasms which resist putrefaction, are to be carefully applied to the disordered part. See FOMENTATION and CATAPLASM.

The fomentation is to be applied hot, several times in a day, to the parts affected, by means of linnen or woollen cloths; and to give a lasting warmth, we may apply a hot tile wrapped up in a thick cloth, or a hot bag of sand.

GANNET, in ornithology, a bird of the larus or gull-kind, frequent on the western coasts of England.

It is equal in size to the common duck. The upper part of the body is of a deep rusty ferrugineous colour, much like

that of the common buzzard ; and the breast and belly are also brown, but paler. It is an extremely singular species, its whole aspect, in some degree, approaching to that of some of the larger birds of prey. See plate CX. fig. 2.

**GANTLET**, or **GAUNTLET**, a large kind of glove, made of iron, and the fingers covered with small plates. It was formerly worn by cavaliers, when armed at all points.

**GANTLET**, in surgery, a kind of bandage for the hand. See **BANDAGE**.

It consists of a swathe four or five yards long, with which they wrap up the hand, and all the fingers, one after another.

**GAOL**, a prison, or place of legal confinement.

Every county has two gaols, one for debtors, which may be wherever the sheriff pleases ; the other for the peace and matters of the crown, which is the county gaol.

If a gaol be out of repair, or insufficient, &c. justices of peace, in their quarter sessions, may contract with workmen for the rebuilding or repairing it ; and by their warrant order the sum agreed on for that purpose, to be levied on the several hundreds and other divisions in the county by a just rate, 11 & 12 Will. III. c. 19. See the article **PRISON**.

**GAOL-DELIVERY**, is where a commission or patent is granted by the king in the nature of a letter, to certain persons, who are thereby appointed his justices, or to two or three of them, authorising them to deliver his gaol, at such a place, of the prisoners contained therein ; and for that end it commands them to meet at such place, at the time they themselves shall appoint, when the sheriff of the county is commanded to bring all the prisoners in the gaol before them, &c. 4 Inst. 168.

The justices of gaol-delivery are empowered by the common law to proceed upon indictments of felony, trespass, &c. and to order execution or reprieve ; they may likewise discharge such prisoners, as on their trials are acquitted, and those against whom, on proclamation made, no evidence has appeared : they have authority to try offenders for treason, and to punish many particular offences by statute. 2 Hawk. 24. 2 Hale's hist. Placit. Cor. 35.

**GAOLER**, the keeper of a gaol or prison. Sheriffs are to make such gaolers for whom they will be answerable : but if there be any default in the gaoler, an ac-

tion lies against him for an escape, &c. yet the sheriff is most usually charged. 2 Inst. 592. Where a gaoler kills a prisoner by hard usage, it is felony. 3 Inst. 52. No fee shall be taken by gaolers, but what is allowed by law, and settled by the judges, who may determine petitions against their extortions, &c. 2 Geo. II. c. 22.

**GAP**, a city and bishop's see of Dauphine, in France, eighteen miles west of Embrun : east longitude  $5^{\circ} 46'$ , north lat.  $44^{\circ} 32'$ .

**GARAGAY**, a rapacious bird of Mexico, about the size of our kite.

**GARBE**, in heraldry, a sheaf of any kind of grain, borne in several coats of arms, and said to represent summer, as a bunch of grapes does autumn.

**GARBLER** of spices, an antient officer in the city of London, who is authorized to enter into shops, ware-houses, &c. there to view and search drugs, spices, &c. and see that they be garbled or cleansed from the dross and dust wherewith they are mixed.

**GARBLING** of bow-staves, the sorting them, or separating the good from the bad.

**GARBOARD-STRAKE**, the plank next the keel of a ship, one edge of which is run into the rabbit made in the upper edge of the keel on each side. Blanckley's Nav. Expof.

**GARCINIA**, in botany, a genus of the *icosandra-monogynia* class of plants, called magoistans by Garcias, from whom Linnaeus has given it the name of garcinia. The flower consists of four roundish, patent petals ; and the fruit is a large unilocular, coriaceous berry, containing eight hairy and fleshy seeds, convex on one side, and angular on the other.

**GARD**, or **GUARD**. See **GUARD**.

**GARDA**, a town of the Veronese, in Italy, subject to Venice : east long.  $11^{\circ}$ , north lat.  $45^{\circ} 25'$ .

**GARDANT**, or **GUARDANT**, in heraldry, denotes any beast full faced, and looking right forward. See plate CXI. fig. 2. which represents a lion gardant.

**GARDELEBEN**, a town of Brandenburg, in Germany : east long.  $11^{\circ} 45'$ , north lat.  $52^{\circ} 40'$ .

**GARDEN**, a plot of ground, cultivated and properly ornamented with a variety of plants, flowers, fruit, &c.

Gardens are usually distinguished into flower-garden, fruit-garden, and kitchen-garden ; the first of which, being designed

signed for pleasure and ornament, is to be placed in the most conspicuous part, that is, next to the back front of the house; and the two latter, being designed for use, should be placed less in sight. But tho' the fruit and kitchen-gardens are here mentioned as two distinct gardens, yet they are now usually in one; and that with good reason, since they both require a good soil and exposure, and equally require to be placed out of the view of the house. See KITCHEN-GARDEN.

In the choice of a place proper for a garden, the most essential points to be considered are the situation, the soil, the exposure, water and prospect.

1st, As to the situation, it ought to be such a one as is wholesome, and in a place neither too high nor too low; for if a garden be too high, it will be exposed to the winds, which are very prejudicial to trees; and if it be too low, the dampness, the vermin, and the venomous creatures that breed in ponds and marshy places, add much to their insalubrity. The most happy situation is on the side of a hill, especially if the slope be easy, and in a manner imperceptible; if a good deal of level ground be near the house; and if it abounds with springs of water; for, being sheltered from the fury of the winds, and the violent heat of the sun, a temperate air will be there enjoyed; and the water that descends from the top of the hill, either from springs or rain, will not only supply fountains, canals, and cascades for ornament, but when it has performed its office, will water the adjacent valleys, and, if it be not suffered to stagnate, will render them fertile and wholesome. Indeed if the declivity of the hill be too steep, and the water be too abundant, a garden on the side of it may frequently suffer, by having trees torn up by torrents and floods; and by the tumbling down of the earth above, the walls may be demolished, and the walks spoiled. It cannot, however, be denied, that the situation on a plain or flat, has several advantages which the higher situation has not: for floods and rain commit no damage; there is a continued prospect of champaigns, intersected by rivers, ponds and brooks, meadows and hills covered with woods or buildings; besides, the level surface is less tiresome to walk on, and less chargeable, than that on the side of an hill, since terrace walks and steps are not there necessary; but

the greatest disadvantage of flat gardens, is the want of those extensive prospects which rising grounds afford.

2dly, A good earth, or soil, is next to be considered; for it is scarce possible to make a fine garden in a bad soil; there are indeed ways to meliorate ground, but they are very expensive; and sometimes when the expence has been bestowed of laying good earth three feet deep over the whole surface, a whole garden has been ruined, when the roots of the trees have come to reach the natural bottom. To judge of the quality of the soil, observe whether there be any heath, thistles, or such-like weeds growing spontaneously in it; for they are certain signs that the ground is poor. Or if there be large trees growing thereabouts, observe whether they grow crooked, ill-shaped, and grubby, and whether they are of a faded green, and full of moss, or infested with vermin; if this be the case, the place is to be rejected: but, on the contrary, if it be covered with good grass fit for pasture, you may then be encouraged to try the depth of the soil. To know this, dig holes in several places, six feet wide, and four feet deep; and if you find three feet of good earth, it will do very well; but less than two, will not be sufficient. The quality of good ground is neither to be stony, nor too hard to work; neither too dry, too moist, nor too sandy and light; nor too strong and clayey, which is the worst of all for gardens.

3dly, The next requisite is water, the want of which is one of the greatest inconveniencies that can attend a garden, and will bring a certain mortality upon whatever is planted in it, especially in the greater droughts that often happen in a hot and dry situation in summer; besides its usefulness in fine gardens for making fountains, canals, cascades, &c. which are the greatest ornaments of a garden.

4thly, The last thing to be considered, is the prospect of a fine country; and tho' this is not so absolutely necessary as water, yet it is one of the most agreeable beauties of a fine garden: besides, if a garden be planted in a low place that has no kind of prospect, it will not only be disagreeable, but unwholesome.

In the laying out and planting of gardens the beauties of nature should always be studied; for the nearer a garden approaches to nature, the longer it will please. The area of a handsome garden,

den, may take up thirty or forty acres, but not more; and the following rules should be observed in the disposition of it. There ought always to be a descent of at least three steps from the house to the garden; this will render the house more dry and wholesome, and the prospect on entering the garden more extensive. The first thing that should present itself to view, should be an open lawn of grass, which ought to be considerably broader than the front of the building; and if the depth be one half more than the width, it will have a better effect: if on the sides of the lawn there are trees planted irregularly, by way of open groves; the regularity of the lawn will be broken, and the whole rendered more like nature. For the convenience of walking in damp weather, this lawn should be surrounded with a gravel walk, on the outside of which should be borders three or four feet wide, for flowers: and from the back of these, the prospect will be agreeably terminated by a slope of ever-green shrubs, which, however, should never be suffered to exclude agreeable prospects, or the view of handsome buildings. These walks may lead thro' the different plantations, gently winding about in an easy natural manner, which will be more agreeable than either those long straight walks, too frequently seen in gardens, or those serpentine windings, that are twisted about into so many short turns, as to render it difficult to walk in them: and as no garden can be pleasing where there is a want of shade and shelter, these walks should lead as soon as possible into plantations, where persons may walk in private, and be sheltered from the wind. Where the borders of the gardens are fenced with walls or pales, they should be concealed with plantations of flowering-shrubs intermixed with lawrels, and other ever-greens, which will have a good effect, and at the same time conceal the fences, which are disagreeable, when left naked and exposed to the sight. Groves are the most agreeable parts of a garden, so that there cannot be too many of them; only that they must not be too near the house, nor be suffered to block up agreeable prospects. To accompany parterres, groves opened in compartments, quincunxes, and arbour-work with fountains, &c. are very agreeable. Some groves of ever-greens should be planted in proper places, and some squares of trees of

this kind may also be planted among the other wood. See *QUINCUNX*, &c.

Narrow rivulets, if they have a constant stream, and are judiciously led about a garden, have a better effect than many of the large stagnating ponds or canals, so frequently made in large gardens. When wilderesses are intended, they should not be cut into stars and other ridiculous figures, nor formed into mazes or labyrinths, which in a great design appear trifling. Buildings, statues, and vases, appear very beautiful; but they should never be placed too near each other: magnificent fountains are also very ornamental; but they ought never to be introduced, except there be water to keep them constantly running. The same may also be observed of cascades and other falls of water. See the articles *CASCADES*, *FOUNTAINS*, &c.

In short, the several parts of a garden should be diversified; but in places where the eye takes in the whole at once, the two sides should be always the same. In the business of designs, the aim should be always at what is natural, great and noble. The general disposition of a garden, and of its parts, ought to be accommodated to the different situations of the ground, to humour its inequalities, to proportion the number and sorts of trees and shrubs to each part, and to shut out from the view of the garden no objects that may become ornamental. And before a garden is planned out, it ought ever to be considered, what it will be when the trees have had twenty years growth. *Miller's Gard. Dict.*

**GARDENING**, a branch of agriculture, containing the cultivation of gardens. See the preceding article.

The art of gardening affords a variety of delights. It teaches how to dispose fruit-trees, flowers, and herbs to the best advantage, whether for profit or pleasure; and shews how to prepare the soil for sowing the different kinds of seeds, as well as how to treat the plants when grown up. It is a pleasure to behold a person employed, amongst the plants of a spacious garden, in reforming, by proper methods, a growth of natural wildings; to see him cultivate mutual alliances between his plants, by grafting or inoculation, whereby the bad are meliorated, and the good rendered still more perfect. By this means, a plant taken from the wilds of a forest, softens its savage nature, and will sometimes divest itself of its

its thorns, when it happens to be associated with a domestic one.

As to the several parts and operations of gardening, the reader will find them described under the articles **SOWING, PLANTING, TRANSPLANTING, GRAFTING, INOCULATION, PRUNING, NURSERY, HOT-BED, GREENHOUSE, WALK, TERRACE, ALLEY, AVENUE, ARBOUR, GROVE, ESPALIERS, STANDARDS, &c.**

**GARDENING** *a hawk*, in falconry, the putting her on a turf of grass to cheer her.

**GARDIAN, or GUARDIAN.** See the article **GUARDIAN**.

**GARDS, or GUARDS.** See **GUARDS**.

**GARDUS**, in ichthyology, a fish more usually called *sargus*. See **SARGUS**.

**GARGANEY**, in ornithology, a bird of the anas or duck-kind, about the size of the common teal, which in many particulars it greatly resembles. It is distinguished by a green spot in the wings, and a white line over the eyes. See the article **ANAS**.

**GARGARISM**, in medicine, is sometimes taken, in a large sense, for every collution of the mouth; but, strictly speaking, it signifies a liquid medicine, appropriated to affections of the mouth, gums, fauces, larynx, and sometimes of the head, received into the mouth, and there used by way of collution, without deglutition.

Gargarizations, according to Celsus, are made for the sake of alleviation, repression, or evacuation. The first intention is answered by milk and cremor of ptisan, or bran; repression is effected by water wherein lentils, roses, brambles, quinces or dates have been bottled; and evacuant gargarisms are mustard and pepper.

**GARIDELLA, FENNEL-LEAVED NIGELLA**, in botany, a genus of the *decandria-trigynia* class of plants. It has no flower petals; but there are five long, equal, and bilabiate nectaria: the fruit consists of three oblong, compressed, acuminate capsules, formed of two valves, and containing numerous small seeds.

**GARLAND**, a sort of chaplet made of flowers, feathers, and sometimes precious stones, worn on the head, in manner of a crown.

**GARLAND** also denotes ornaments of flowers, fruits, and leaves, intermixed, antiently much used at the gates of temples, where feasts and solemn rejoicings were held; or at any other place where marks of public joy or gaiety were

required, as at triumphal arches, tournaments, &c.

The flowers and greens whereof garlands were composed, were various. The antients made no public entertainment but upon the festivals of the gods; and then the garlands, hymns and songs, were that part of the entertainment the gods were supposed to delight in, according to Athenæus. And in latter ages of antiquity, upon the public festival of any god, they used that particular herb or flower supposed to be sacred to that deity: but, at other times, all such herbs were made use of as the season would best admit of, or as they thought were most conducive to pleasure, health, or refreshment. Garlands were not confined to the head only, but other parts of the body, particularly the breast, were adorned with them.

**GARNET, granatus**, in natural history, a very beautiful gem, of a red-colour, with an admixture of bluish. When pure and free from blemishes, it is little inferior, in appearance, to the oriental ruby, tho' only of a middle degree of hardness between the sapphire and common crystal. It is found of various sizes, from that of a pin's head to an inch in diameter.

Among our lapidaries and jewellers, genuine garnets are known by different names, according to their different degrees of colour. 1. The garnet, simply so called, is the finest and most valuable kind, being of a very deep blood-red, with a faint admixture of blue. 2. The rock-ruby, a name very improperly given to the garnet, when it is of a very strong but not deep red, and has a fairer cast of the blue: this is a very beautiful gem.

3. The *forane* or *ferain* garnet, that of a yet brighter red, approaching to the colour of native cinnabar, with a faint blue tinge. 4. The *almandine*, a garnet only a little paler than that called the rock-ruby.

Garnets are very properly distinguished into the oriental and occidental kinds, as being found in Europe as well as the East-Indies. The oriental ones are principally brought from Calicut, Cananor, and Cambay; and the european ones are common in Italy, Hungary, and Bohemia.

Some authors have supposed the deeper-coloured garnet to be the same with the carbuncle of the antients, from which it really differs; since, on receiving the sun's

fun's beams, it never gives so true a fire-colour as the carbuncle. See the article **CARBUNCLE**.

**Counterfeit GARNET**, or **GARNET-PASTE**, a preparation of glass, the colour of which emulates that of the genuine garnet. See the article **GLASS-MAKING**.

This paste is made three different ways.

1. By mixing two ounces of prepared crystal with six of common red-lead, and adding sixteen grains of manganese, and three grains of zaffer. 2. By adding  $5\frac{1}{2}$  ounces of minium to two of crystal, and then mixing with them fifteen grains of manganese, and four grains of zaffer. 3. By mixing five ounces of minium with two ounces of prepared crystal, and adding fifty-two grains of manganese, and six grains of zaffer. This last makes by far the most elegant garnet-paste.

**GARNET**, in a ship, is a tackle having a pendant coming down from the main-mast, with a block well seized to the main-stay, just over the hatch-way, to which a guy is fixed to keep it steady; and at the other end is a long tackle-block, in which the fall is reeved, that so by it any goods or casks may be hauled and hoisted into or out of the ship. When this garnet is not used, it is fastened along the stay.

**Clew-GARNET**, in a ship. See **CLEW**.

**GARNISH**, in law-books, signifies to warn; in which sense, to garnish the heir, is mentioned in stat. 27 Eliz. c. 3. See the article **GARNISHMENT**.

**GARNISHEE**, is used for the third person or party in whose hands money is attached within the liberties of the city of London, in the sheriff's court there; and he is so called, because he has had garnishment or warning not to pay the money, but to appear and answer to the plaintiff creditor's suit.

**GARNISHMENT**, is a warning given to a person for his appearance, for the better furnishing of the cause and court; as where a person is sued for detaining charters or other writings delivered him by the plaintiff, and another person, upon some certain conditions; and therefore he prays that the other person may be warned to plead with the plaintiff, whether the conditions are or are not performed; which is the praying of garnishment; and interpreted to be either a warning of that other, or a furnishing the court with parties sufficient to determine the cause.

**GARONNE**, a large river of France, which taking its rise in the Pyrenean mountains, runs north-west by the city of Tholouse, divides the provinces of Guienne and Gascony, and visiting the city of Bourdeaux, falls into the bay of Biscay, about sixty miles below that city. It has also a communication with the Mediterranean, by means of the royal canal of Lewis XIV.

The tide flows up this river twenty miles above Bourdeaux.

**GAROSMUS**, in botany, a name by which stinking orach is sometimes called.

**GARRISON**, in the art of war, a body of forces, disposed in a fortress, to defend it against the enemy, or to keep the inhabitants in subjection; or even to be subsisted during the winter season: hence, garrison and winter-quarters are sometimes used indifferently, for the same thing; and sometimes they denote different things. In the latter case, a garrison is a place wherein forces are maintained to secure it; and where they keep regular guard, as a frontier town, a citadel, castle, tower, &c. The garrison should always be stronger than the townsmen.

Winter-quarters signify a place where a number of forces are laid up in the winter season, without keeping the regular guard. See **WINTER-QUARTERS**.

**GARRISON-TOWN**, a strong place in which troops are quartered, and do duty, for the security thereof; keeping strong guards at each port, and a main guard in the market-place.

**GARRISON**, in geography, a town of Ireland, in the county of Fermanagh, and province of Ulster: west long.  $8^{\circ} 20'$ , and north lat.  $54^{\circ} 16'$ .

**GARRULUS**, in ornithology, a bird called in the English the roller. See **ROLLER**.

**GARSTANG**, a market-town of Lancashire, ten miles north of Preston.

**GARTER**, a ligature for tying up the stocking; but particularly used for the badge of a noble order of knights, hence denominated the

*Order of the GARTER*, a military order of knighthood, the most noble and antient of any lay-order in the world; instituted by king Edward III. This order consists of twenty-six knights-companions, generally princes and peers, whereof the king of England is the sovereign, or chief. They are a college or corporation, having a great and little seal.

Their





Fig. 1. Order of the GARTER.

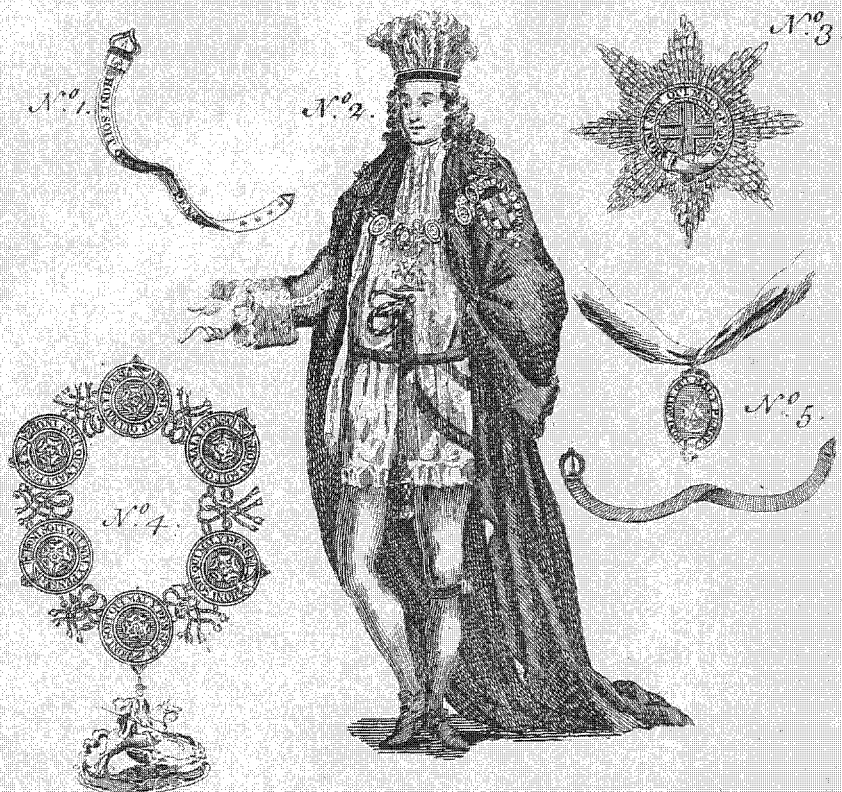


Fig. 2. GORE. Fig. 3. GIRONNE. Fig. 4. GARDANT.

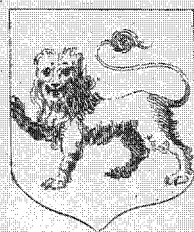
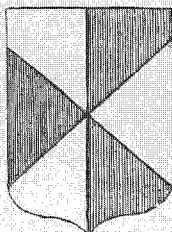
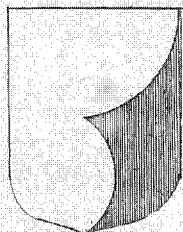
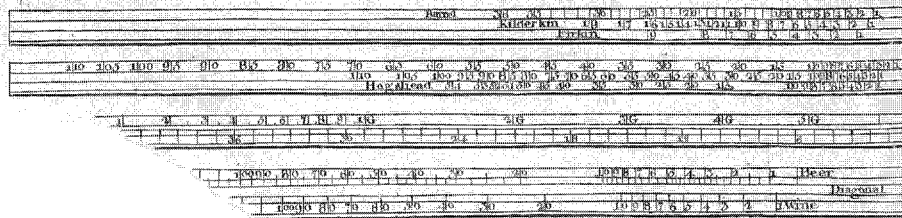


Fig. 5 GAUGING ROD.



Their officers are a prelate, chancellor, register, king at arms; and usher of the black rod. They have also a dean with twelve canons, and petty canons, vergers, and twenty-six pensioners, or poor knights. The prelate is the head. This office is vested in the bishop of Winchester, and has ever been so. Next to the prelate is the chancellor, which office is vested in the bishop of Salisbury, who keeps the seals, &c. The next is the register, who by his oath is to enter upon the registry, the scrutinies, elections, penalties, and other acts of the order, with all fidelity. The fourth officer is garter, and king at arms, being two distinct offices united in one person. Garter carries the rod and scepter at the feast of St. George, the protector of this order, when the sovereign is present. He notifies the elections of new knights, attends the solemnity of their installations, carries the garter to the foreign princes, &c. He is the principal officer within the college of arms, and chief of the heralds. See KING at arms.

All these officers, except the prelate, have fees and pensions. The college of the order is seated in the castle of Windsor, with the chapel of St. George, and the chapter-house, erected by the founder for that purpose. The habit and ensign of the order are a garter, mantle, cap, george, and collar. The four first were assigned the knights companions by the founder; and the george and collar, by Henry VIII. The garter (see plate CXI. fig. 1. n° 1.) challenges preeminence over all the other parts of the dress, by reason that from it the noble order is denominated; that it is the first part of the habit presented to foreign princes, and absent knights, who, and all other knights elect, are therewith first adorned; and it is of so great honour and grandeur, that by the bare investiture with this noble ensign, the knights are esteemed companions of the greatest military order in the world. It is worn on the left leg between the knee and calf, and is enamelled with this motto, HONI SOIT QUI MAL Y PENSE; i. e. "shame to him that thinks evil hereof." The meaning of which is, that king Edward having laid claim to the kingdom of France, retorted shame and defiance upon him that should dare to think amiss of the just enterprize he had undertaken, for recovering his lawful right to that crown, and that the bravery of those

knights whom he had elected into this order, was such as would enable him to maintain the quarrel against those that thought ill of it.

The mantle (*ibid.* n° 2.) is the chief of those vestments made use of upon all solemn occasions. The colour of the mantle is by the statutes appointed to be blue. The length of the train of the mantle only distinguishes the sovereign from the knights companions. To the collar of the mantle is fixed a pair of long strings, antiently wove with blue silk only, but now twisted round, and made of Venice gold and silk, of the colour of the robe, with knobs, or buttons, and tassels at the end. The left shoulder of the mantle has from the institution been adorned with a large garter, with the device HONI SOIT, &c. within this is the cross of the order, which was ordained to be worn at all times by king Charles I. At length the star was introduced, being a sort of cross irradiated with beams of silver. (*ibid.* n° 3.)

The collar (*ibid.* n° 4.) is appointed to be composed of pieces of gold in fashion of garters, the ground enamelled blue, and the motto gold. See COLLAR. The manner of electing a knight companion into this most noble order, and the ceremonies of investiture, are as follow. When the sovereign designs to elect a companion of the garter, the chancellor belonging to this order draws up the letters, which passing both under the sovereign's sign manual and signet of the order, are sent to the person by garter principal king at arms, and are in this manner, or to the same effect. "We, with the companions of our most noble order of the garter, assembled in chapter, holden this present day at our castle at Windsor, considering the virtuous fidelity you have shewn, and the honourable exploits you have done in our service, by vindicating and maintaining our right, &c. have elected and chosen you one of the companions of our order. Therefore, we require you to make your speedy repair unto us, to receive the ensigns, thereof, and be ready for your installation upon the — day of this present month, &c."

The garter, which is of blue velvet bordered with fine gold wire, having commonly the letters of the motto of the same, is, at the time of election,

buckled upon the left leg, by two of the senior companions, who receive it from the sovereign, to whom it was presented upon a velvet cushion by garter king at arms, with the usual reverence, whilst the chancellor reads the following admonition, enjoined by the statutes. "To the honour of God omnipotent, and in memorial of the blessed martyr St. George, tye about thy leg, for thy renown, this noble garter; wear it as the symbol of the most illustrious order, never to be forgotten, or laid aside; that thereby thou mayst be admonished to be courageous, and having undertaken a just war in which thou shalt be engaged, thou mayst stand firm, valiantly fight, and successively conquer."

The princely garter being thus buckled on, and the words of its signification pronounced, the knight elect is brought before the sovereign, who puts about his neck, kneeling, a sky-coloured ribbon, (*ibid.* n° 5.) whereunto is appendant, wrought in gold within the garter, the image of St. George on horseback, with his sword drawn, encountering with the dragon. In the mean time, the chancellor reads the following admonition: "Wear this ribbon about thy neck, adorned with the image of the blessed martyr and soldier of Christ, St. George, by whose imitation provoked, thou mayst so overpass both prosperous and adverse adventures, that having stoutly vanquished thy enemies both of body and soul, thou mayest not only receive the praise of this transient combat, but be crowned with the palm of eternal victory."

Then the knight elected kisses the sovereign's hand, thanks his majesty for the great honour done him, rises up, and salutes all the companions severally, who return their congratulations. N° 2. *ibid.* exhibits a view of a knight of the garter in the habit of this order. Since the institution of this order, there have been eight emperors, and twenty-eight kings, besides numerous sovereign princes enrolled as companions thereof. Its origin is somewhat differently related: the common account is, that it was erected in honour of a garter of the countess of Salisbury, which she dropped dancing with king Edward, and which that prince picked up; but our best antiquaries think it was instituted on account of the victory over the French at

Cressy, where the king ordered his garter to be displayed as a signal of the battle.

**GARTH**, signifies a little clove, or backside, in the north of England; also a wear. See the article **WEAR**.

**GARTHMAN**, a term formerly used for a fisher-man.

**GARUM**, among physicians, denotes the brine, or pickle, wherein anchovies, herrings, &c. are preserved. See the article **PICKLE**.

**GARYOPHYLLUS**, or **CARYOPHYLLUS**, in botany, &c. See the article **CARYOPHYLLUS**.

**GAS**, among chemists, a term made use of by Helmont, to signify, in general, a spirit incapable of coagulation, such as proceeds from fermented wine.

In particular, it has various significations; thus, gas vitale, is the spirit of our life, the light and the balsam, which preserves from corruption. The gas pingue sulphureum is what is suddenly mortal, being lethiferous exhalations arising principally in caves and mines. Gas sulphuris, the gas or spirit of sulphur, is made by burning sulphur under a glass bell set over a vessel of water, till the water is sufficiently impregnated with the sulphur. The gas sylvestre is that invisible and incoercible spirit which arises from vegetable juices under fermentation. Helmont makes several other distinctions of gas; as the gas ventosum, which is mere air; the gas siccum, which is sublimate de flatibus; the gas salium, and the gas fructuum, which are mere elementary water.

**GASE-HOUND**, or **GAZE-HOUND**. See the article **GAZE-HOUND**.

**GAZCOIN**, or **GASCOIGN**, denotes the hinder thigh of a horse, which begins at the stifle, and reaches to the ply or bending of the ham.

**GASCONY**, the most south-west province of France, bounded by Guienne, on the north; by Languedoc, on the east; by the Pyrenees, which separate it from Spain, on the south; and by the bay of Biscay on the west.

The inhabitants of this province are remarkable for vaunting and pretending to improbabilities; whence the like pretence, in others, is called a gasconade.

**GASKOIN**, or **GASCOIN**. See **GASCOIN**. **GASSENHOVEN**, or **GUTZENHOVEN**, a town of the Austrian Netherlands, fifteen miles east of Louvain: east long. 5°, and north lat. 50° 55'.

**GAS-**

**GASTALDUS**, or **CASTALDUS**, an officer antiently entertained in the courts of divers princes.

The *gastaldus* was what in Italy and Spain is now called *major domo*, or the master or steward of an household. The *gastaldus* was a comes or count, which shews his office to have been very considerable.

In the laws of Italy we sometimes met with a *gastaldus* in the sense of a carrier, and sometimes as an ecclesiastical officer.

**GASTEROSTEUS**, in ichthyology, a genus of acanthopterygious fishes, distinguished by having only three small bones in the branchiostegæ membrane, and the belly almost entirely covered with oblong bony laminae.

To this genus belong the common stickle-back, the lesser stickle-back, and the great stickle-back. See the article **STICKLE-BACK**.

**GAST-HOUND**, or **GAZE-HOUND**. See the article **GAZE-HOUND**.

**GASTRO-EPIPLOIC VEIN**, a vein that opens into the *vena portæ*. See **VEIN**.

**GASTRIC**, in general, something belonging to the stomach. See **STOMACH**.

**GASTRIC JUICE**, *gastricus succus*, among physicians, a thin, pellucid, spumous, and saltish liquor, which continually distills from the glands of the stomach, for the dilution of the food. See **FOOD**.

**GASTRIC VESSELS**, in anatomy, the arteries and veins of the stomach. See the articles **ARTERY** and **VEIN**.

**GASTRILOQUUS**, the same with *ventriloquus*. See **VENTRILOQUUS**.

**GASTROCNEMIUS**, in anatomy, the name of two thick, pretty broad, and oblong muscles, which form a great part of what is called the calf of the leg. They are situated laterally with respect to each other, under the poples.

**GASTROCNEMIUS** is also the name of one of the extensor-muscles of the foot.

**GASTROMANCY**, *γαστρομαντεία*, a method of divination by water, practised by the antient Greeks in the following manner. They filled certain round glasses with fair water, about which they placed lighted torches: then invoked a dæmon, praying in a low, murmuring voice, and proposed the question to be solved. A chaste and unpolluted boy, or a woman big with child, was appointed to observe with great care and exactness, all the alteration in the glasses; at the same time desiring, beseeching, and com-

manding an answer; which, at length, the dæmon used to return by images in the glasses; which, by reflexion from the water, represented what should come to pass.

**GASTRORAPHY**, *γαστροραφία*, in surgery, the operation of sowing up wounds of the abdomen. See **ABDOMEN**.

There are two cases in which this operation is absolutely necessary; the first is, where the wound is so large, that there is no possibility of retaining the intestines by any other method; for as the intestines are continually pushed forward in the act of inspiration, by the action of the diaphragm and the abdomen, the falling down of the intestines in this case is unavoidable, and therefore the operation is necessary. The other is in large transverse wounds of the abdomen, where the muscles are divided, but the peritonæum is not concerned.

In wounds of the abdomen the chief inquiry is, whether the omentum or intestines are let out. If none of these have burst through the wound, the lips of the wound must be kept as close together as possible with the hands, and the patient kept with his head lying downwards, till the wound is sufficiently secured from letting out the contents of the abdomen. But when the intestines are already fallen out, they must be returned with the greatest expedition, lest they should receive any injuries from the external air. It is first to be examined, however, whether they have received any wound, or not; and whether they preserve their natural warmth and colour: for where they are cold, livid, dry, or wounded, they are not to be returned suddenly, but fomented with warm milk and water, or wraped up for some time in the cawl of some animal newly killed, till they have in some degree recovered their natural heat and colour.

You will easily perceive, that there is some hurt in the intestines, though the wound does not immediately appear, if there is a more than ordinary flaccidity in them; in which case, the rest of the intestines must be pulled gently forward till you find the wound. See the article **INTESTINES**.

If nothing of this sort is the case, but the intestines are in their natural state and condition, they must be instantly returned in the following manner. The patient being placed in a supine posture, and laid on that side that is opposite to

the wound, the intestine must be returned by the aperture of the wound, with the two fore fingers; taking care never to take off one finger, till the other is on the gut. The patient is all the while to hold his breath, and the lips of the wound must be then brought together. If the intestines have been forced through a small wound, and are afterwards distended with wind, that they cannot easily be returned, it is necessary to pull the intestine gently forward, that more of it may come out, and the wind take up less room in any one part. An assistant should then gently dilate the wound as far as may be, either with his hand, or with two hooks fixed in the internal membrane, while the surgeon returns the intestines. When this is done, the wound must be secured first with the hand, and then with the proper dressings; and, in this case, the surgeon may avoid the use of this painful operation. But if the wound is so narrow, that the gut can neither be reduced nor pulled forward, the aperture must be enlarged with the knife.

The operation of gastrotomy, when found necessary, may be performed in the following manner; first pass a strong double, or quadruple thread well waxed through two crooked needles, and with these stitch up both ends of the wound, beginning at one end with the upper lip of the wound, passing the needle thro' the peritonæum, muscles of the abdomen, and the common integuments, from within outwards, leaving only the breadth of a thumb between the stitches, and the mouth of the wound, observing the same method in passing the other needle thro' the lower lip; and, while you are passing the needle with one hand, it will be proper to support the lips of the wound with the other, to prevent the intestines from being wounded. In a wound of two fingers-breadth, one stitch in the middle will be sufficient; but in larger wounds the stitches must be repeated in proportion to their size, leaving a thumb's breadth between each of the sutures, the extremities of the thread are to be left hanging down on each side; and when the suture is finished, while an assistant holds the lips of the wound together, these ends are to be tied in knots, in the following manner. Both ends of the threads are to be taken up, and to be tied in a double knot, passing a small

bolster between the two knots, to prevent the skin from being hurt. Where there are more sutures than one, you must begin at the upper part of the wound, tying them down in order; that before the last is tied, a soft tent of the size of a finger, with a thread fastened to the end of it, may be introduced into the lower part of the wound. This tent will keep a passage open for the evacuation of grumous blood, or matter, which may be collected in the cavity of the abdomen. The wound, when all this is done, must be anointed with some vulnerary balsam, and covered with pledgits of lint, a sticking plaster, and bolsters, securing all with the scapulary bandage.

**GASTROTOMY**, γαστροτομία, in surgery, the cutting open the abdomen and uterus, as in the cæsarian section. See the article CÆSARIAN.

**GATE**, in architecture, a large door, leading, or giving entrance into a city, town, castle, palace, or other considerable building: or a place giving passage to persons, horses, coaches, or waggons, &c. As to their proportion, the principal gates for entrance through which coaches and waggons are to pass, ought never to be less than seven feet in breadth, nor more than twelve, which last dimension is fit only for large buildings. The height of a gate is to be  $1\frac{1}{2}$  of the breadth, and somewhat more; but as for common gates in inns, under which waggons go loaded with hay, straw, &c. the height of them may be twice their breadth.

**Paired GATES**, such as are set up in fences for shutting up the passages into fields, and other inclosures.

These are of two sorts, either of sawed or cleft timber.

**Opening of the GATES** in astrology. See the article OPENING.

**GATE**, in the manege, the going or pace of a horse.

**GATE of the sea**, or **SEA-GATE**, in the sea-language. When two ships are aboard one another, by means of a wave or billow, it is usual to say they are aboard one another in a sea-gate.

**GATE**, in geography, a chain of mountains that run through the middle of the hither Peninsula of India, from south to north.

**GATHER**, in the sea-language, is said of a ship that gets the wind of another.

**GATTON**

**GATTON**, a borough town of Surry, sixteen miles south of London, which sends two members to parliament.

**GAVALI**, a name by which *bdellium* is sometimes called. See *BDELLIUM*.

**GAVEL**, or **GABLE**, among builders. See the article **GABLE**.

**GAVELET**, in law, an antient and special cessavit used in Kent, where the custom of gavel-kind continues, by which the tenant, if he withdraws his rent and services due to the lord, forfeits his lands and tenements.

In respect to this gavellet the lord was to seek by award of his court from three weeks to three weeks, to find some distress upon the lands, until the fourth court; and if in that time he could find no distress on the premises whereby he might have justice of his tenant; then, at the fourth court, it was awarded, that the lord should take the lands, &c. into his hands, in the name of a distress, and keep it a year and a day without manuring, in which space of time, if the tenant did not come and pay his arrearages, and make the lord amends, then the lord was to go to the next county-court with his witnesses of his own court, and pronounce there the process; after which, by the award of his court, he became intitled to enter and manure those lands or tenements as his own. And if the tenant wanted to re-enjoy his lands, &c. as he did before, he was then obliged to make agreement with the lord for the same.

**GAVELET**, in London, is a writ used in the hustings, given to lords of rents in the city of London.

**GAVELKIND**, a tenure or custom belonging to lands in the county of Kent, by which the lands of the father are, at his death, equally divided among all his sons; or the land of a deceased brother, in case he leaves no issue, among all the brethren. This is by some called antient socage-tenure: the custom came from our saxon ancestors, among whom the inheritance of lands did not descend to the eldest, but to all the sons alike; and the reason why it was retained in Kent is, because the kentish men were not conquered by the Normans in the time of William I.

The particular customs attending this tenure are, that the heir, at the age of fifteen, may give or sell his lands in gavelkind; and tho' the father is attainted of treason and felony, and suffers

death, the son shall inherit. A wife shall be endowed of a moiety of the gavelkind-lands, of which her husband died seised, during her widowhood. Likewise a husband may be tenant by curtesy of half his wife's lands, without having any issue by her; but if he marries again, not having issue, he forfeits his tenancy.

**GAVELMAN**, a tenant liable to pay tribute.

**GAVELMED**, the duty of mowing grass, required by the lord of his customary tenants.

**GAVELCESTER**, the same with **Tolcester**. See the article **TOLCESTER**.

**GAVEREN**, or **WAVEREN**, a town of the Austrian Netherlands, situated on the east-bank of the river Scheld: east long.  $3^{\circ} 35'$ , north lat.  $51^{\circ}$ .

**GAUGE**, or **GAGE**. See **GAGE**.

**GAUGE-LINE**, on the gauging-rod. See the article **GAUGING**.

**GAUGE-POINT**, of a solid measure, the diameter of a circle, whose area is equal to the solid content of the same measure. Thus, the solidity of a wine-gallon being 231 cubic inches, if you conceive a circle to contain so many inches, the diameter of it will be 17.15; and that will be the gauge-point of wine-measure. And an ale-gallon, containing 282 cubic inches, by the same rule, the gauge-point for ale-measure will be found to be 19.15. After the same manner, may the gauge-point of any foreign measure be obtained; and from hence may be drawn this consequence, that when the diameter of a cylinder, in inches, is equal to the gauge-point of any measure, given likewise in inches, every inch in length thereof will contain an integer of the same measure, *e. gr.* in a cylinder whose diameter is 17.15 inches, every inch in height contains one entire gallon in wine measure; and in another, whose diameter is 18.95 inches, every inch in length contains one ale-gallon.

**GAUGER**, a king's officer, who is appointed to examine all tuns, pipes, hog-heads, and barrels of wine, beer, ale, oil, honey, &c. and give them a mark of allowance, before they are sold in any place within the extent of his office.

There are divers statutes that mention this officer and his office; as by 27 Ed. III. c. 8. all wines, &c. imported are to be gauged by the king's gaugers, or their deputies, otherwise they shall be forfeited, or their value; and on default  
of

of the gauger, that he be not ready to do his office when required, or that he defrauds in doing his office to the damage of the buyer or seller, he shall pay the party grieved his treble damage, lose his office, be punished by imprisonment, and be ransomed at the king's will : and in case less be found in the tun or pipe than ought to be, the value of as much as shall lack, shall be deducted in the payment.

Every gauger shall truly, within the limits of his office, gauge all tuns, butts, pipes, tierces, puncheons, tertians, hogheads, barrels, and rundlets; and mark on the head of every vessel the contents, upon pain to forfeit to the party to whose use the wine, &c. shall be sold, four times the value of that which the vessel marked shall lack of his content : the same forfeiture shall be recovered by an original writ, &c. and every person selling the wine, &c. in the vessel marked, shall allow of the price, the value of the lack of gauge, or default of filling, upon pain of forfeiture to the buyer, double the value, to be recovered with costs as before. No brewer shall put to sale any beer or ale in vessels brought from beyond the sea, within the city of London, or suburbs of the same, or within two miles compass without the suburbs, before the same be gauged, and the true content of every such vessel set upon the same, by the gallon appointed for beer and ale, according to the standard, by the master and wardens of the coopers of London.

**GAUGING**, the art or act of measuring the capacities or contents of all kinds of vessels, and determining the quantities of fluids or other matters contained therein.

The art of gauging is that branch of the mathematics called stereometry, or the measuring of solids ; because the capacities of all sorts of vessels used for liquors, as cubical, parallelopipedal, cylindrical, spheroidal, conical, &c. are computed as though they were really solid bodies, and reduced thereby to some known cubic measure, as gallons, quarts, pints, &c. The principal vessels that come under its operation are pipes, barrels, rundlets, and other casks ; also backs, coolers, vats, &c.

The solid content of cubical, parallelopipedal, and prismatical vessels is easily found in cubic inches, or the like, by multiplying the area of the base by the perpendicular height. And for cylindri-

cal vessels, the same is found by multiplying the area of the base by the perpendicular altitude as before. See the articles CUBE, PARALLELOPIPED, &c.

Casks of the usual form of hogheads, kilderkins, &c. may be considered as segments of a spheroid cut off by two planes, perpendicular to the axis ; which brings them to Oughtred's theorem for measuring ale and wine-casks, which is thus : add twice the area of the circle at the bung, to the area of the circle of the head ; multiply the sum by one third of the length of the cask, the product is the content of the vessel in cubic inches.

But for accuracy, Dr. Wallis, Mr. Caswell, and others, think that most of our casks had better be considered as frustums of parabolic spindles, which are less than the frustums of spheroids of the same base and height, and give the capacity of vessels nearer the truth than either Oughtred's method, which supposes them spheroids ; or than that of multiplying the circles of the bung and head, into half the length of the cask, which supposes them parabolic conoids ; or than that of Clavius, &c. who takes them for two truncated cones, which is farthest off of all.

The common rule for all wine or ale-casks, is to take the diameters at the bung and at the head, by which you may find the area of the circle there ; then taking two thirds of the area of the circle at the bung, and one third of the area of the circle at the head, and adding them together into one sum ; this sum multiplied by the internal length of the cask, gives the content in solid inches ; which are converted into gallons by dividing by 282 for ale, and 231 for wine-gallons.

But gauging, as now practised, is chiefly done by means of instruments called gauging-rods or rulers, which do the business as once, and answers the question without so much calculation, which is no inconsiderable addition both to the ease and dispatch of the work, though it is not so much to be depended on.

The methods of gauging which are mostly used, is by the four-foot gauging-rod and Everard's sliding ruler : the description and uses of both are as follows :

*The four-foot GAUGING-ROD* (plate CXI. fig. 5.) is usually made of box, and consists of four rules, each a foot long, and about three eighths of an inch square, joined together by three brass-joints ; by which means the rod is rendered four feet long



long when the four rules are opened, and but one foot when all are folded together. On the first face of this rod, marked 4, are placed two diagonal lines, one for beer and the other for wine; by means of which the content of any common vessel in beer or wine-gallons, may be readily found, by putting the brafed end of the gauging-rod into the bung-hole of the cask, with the diagonal lines upwards, and thrust this brafed end to the meeting of the head and staves; then with chalk make a mark at the middle of the bung-hole of the vessel, and also on the diagonal lines of the rod, right against or over one another, when the brafed end is thrust home to the head and staves; then turn the gauging-rod to the other end of the vessel, and thrust the brafed end home to the end as before. Lastly, see if the mark made on the gauging-rod, come even with the mark made on the bung-hole, when the rod was thrust to the other end; which if it be, the mark made on the diagonal lines, will, on the same lines, shew the whole content of the cask in beer or wine-gallons. If the mark made on the bung-hole be not right against that made on the rod, when you put it the other way, then right against the mark made on the bung-hole, make another on the diagonal lines; and the division on the diagonal line, between the two chalks, will shew the whole content of the vessel in beer or wine-gallons. Thus, *e. gr.* if the diagonal line of a vessel be  $28\frac{4}{5}$  inches, its content in beer-gallons will be nearly 51, and in wine-gallons 62.

If a vessel be open, as a half barrel, tun, or copper, and the measure from the middle on one side to the head and staves be 38 inches, the diagonal line gives 122 beer-gallons; half of which, *viz.* 61, is the content of the half tub.

If you have a large vessel, as a tun or copper, and the diagonal line taken by a long rule be 70 inches; then every inch at the beginning-end of the diagonal line call 10 inches: thus 10 inches become 100 inches; and every tenth of a gallon call 100 gallons; and every whole gallon call 1000 gallons.

On the second face, 5, are a line of inches and the gauge-line, which is a line expressing the areas of circles (whose diameters are the correspondent inches) in ale-gallons: at the beginning is wrote *Ale-area*. Thus, to find the content of any cylindrical vessel in ale-gallons; seek the

diameter of the vessel in inches, and just against it, on the gauge-line, is the quantity of ale-gallons contained at one inch deep; this multiplied by the length of the cylinder, will give its contents in ale-gallons.

On the third face, 6, are three scales of lines; the first, at the end of which is written *Hoghead*, is for finding how many gallons there are in a hoghead, when it is not full, lying with its axis parallel to the horizon. The second line, at the end of which is written *B. L.* is for the same purpose. The third is to find how much liquor is wanting to fill up a butt, when it is standing; at the end of it is wrote *B. S.* signifying, *butt standing*.

Half way the fourth face of the gauging-rod, 7, there are three scales of lines, to find the wants in a firkin, kilderkin, and barrel, lying with their axes parallel to the horizon. They are distinguished by the letters *F. K. B.* signifying a firkin, kilderkin, and barrel.

The use of the lines on the two last faces is very easy; you have only to put it downright into the bung-hole to the opposite staves, if the vessel, you want to know the quantity of ale-gallons contained therein, be lying; and then where the surface of the liquor cuts any one of the lines appropriated to that vessel, will be the number required.

*Everard's sliding-rule* is principally used in gauging, being ordinarily made of box, a foot long, an inch broad, and  $1\frac{5}{16}$  inch thick, with two small scales to slide in it, which may be drawn out, one towards the right hand, and the other towards the left, till the whole be 3 feet long. See plate CXII.

The principal lines on the instrument are those commonly known by the name of Gunter's line, or Line of numbers, which are here distinguished one from another by certain letters, set at the end of the lines, towards the right hand: thus the lines D are each of them one single line of numbers, beginning at the end of the rule towards the left hand, and from thence continued to the other end. The lines A, B, and C, are called double numbers, each being two lines or radiuses of numbers; the line E is called triple numbers, being three radiuses of numbers: this triple line is equal in length to the double lines, and all to the single line; for all the five begin and end at the same point. On the line A are four brass center-pins, two in each radius; one in each of which

which is marked M B. to signify that the number it is set against, 2150.42, is the cubic inches in a malt-bushel. The other two are marked with A. to signify that the numbers they are set against, 282, are the cubic inches in an ale-gallon. Close to the figure 7, in the first radius on the same line, is a dot marked *f*.i. set exactly over .707, denoting .707 to be the side of a square inscribed in a circle, whose diameter is unity. Close to 9 is another dot, marked *f*e. set over .886, which is the side of a square, equal to the area of a circle, whose diameter is unity. Another dot nigh W, is set over 231, the cubic inches in a wine-gallon; and another near C, is set over 3.141592, the circumference of a circle, whose diameter is unity. The line marked M D. to signify *malt-depth*, is no more than a line of numbers in a reverse order, the number 1 being set directly against M. B. on the first radius, and is of exceeding great use in casting up of malt-gauges.

On the line D. there are four center-pins, the first, marked W G. is the gauge-point of a wine-gallon, *i. e.* the diameter of a cylinder whose height is 1 inch, and content 231 cubic inches, or a wine-gallon, which is 17.15 inches. The second center-pin, marked A G. stands at the gauge-point for an ale-gallon, which is 18.95 inches. The third, M S. stands at 46.3, the side of a square, whose content is equal to the inches of a solid bushel. The fourth, M R. is the gauge-point for a malt-bushel, which is 52.32 inches. The two lines of segments are each numbered from 1, 2, &c. to 100: the first is for finding the ullage of a cask taken as the middle frustum of a spheroid, lying with its axis parallel to the horizon: and the second for finding the ullage of a cask standing.

Again, on one of the narrow sides, noted *e*, are, 1°. a line of inches, numbered 1, 2, 3, &c. to 12, each subdivided into 10 equal parts. 2°. A line, by which, with that of inches, we find a mean diameter for a cask, in the figure of a middle frustum of a spheroid. 3°. A line for finding the mean diameter of a cask in the figure of the middle frustum of a parabolic spindle, which gaugers call the second variety of casks. 4°. One for the third variety, which is of a cask in the figure of two parabolic conoids abutting on a common base.

On the other narrow face, marked *f*. are, 1°. A foot, divided into 100 equal parts,

marked F M. 2°. A line of inches, noted I M. 3°. A line F C. for finding the mean diameter of the fourth variety of casks, which is the middle frustum of two cones, abutting on a common base.

On the backside of the sliding-piece is a line of inches from 13 to 36, when the two pieces are put endwise; and against that, the correspondent gallons, or hundred parts, that any small or like open vessel, from 13 to 36 inches diameter, will contain at one inch deep.

*The uses of the sliding-rule in some parts of arithmetic.*

Problem I. Having two numbers given, to find a third geometrically proportional unto them; and to three, a fourth; and to four, a fifth, &c.

Find one of the numbers given, upon the line B, and set it against the other given number, on the line A; then find the same number on B (which was last counted) upon A; and against this third upon B, is the fourth on A. In like manner, against the fourth on B, you have the fifth on A, &c.

Example. Let it be required to find a third proportional to these two numbers, 2 and 4, which may bear the same proportion to 4, that 4 does to 2?

Draw out the sliding-rod, till 2 upon B stand against 4 upon A; then against 4 upon B, is 8 (the third proportional) upon A; and against this third (*viz.* 8) upon B, is 16 upon A, which is the fourth proportional, &c. Contrariwise, if it were required to find a third proportional to the same numbers, 2 and 4, which may bear the same proportion to 2, that 2 bears to 4? Set 4 in the second radius upon A, to 2 upon B; then against 2 upon A (towards the left hand) is 1, the third proportional; and against 1 upon A, is .5, the fourth upon B: also against this fourth upon A, is .25, the fifth proportional on B, &c.

Problem II. One number being given to be multiplied by another, to find the product. In multiplication, either of whole numbers, mixed or decimal fractions, the proportion is, As 1: the multiplicator:: the multiplicand: the product.

Example. Let it be required to multiply 6 by 4. The proportion then is as 1: 4:: 6: 24. Therefore set 1 upon the line B, to 4 upon the line A; then against 6 upon B, is 24, the product sought, upon A.

Faces of the Rule. *Facing page 136*  
 Edges of the Rule.  
 The Inside of 3 Sliders.

## EVERARD'S SLIDING RULE.

**CXXI**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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*Opposite each*



**Problem III.** One number being given to be divided by another, to find the quotient. In division, both of whole numbers and mixed, the proportion is, as the divisor is to 1, so is the dividend to the quotient.

**Example.** Let it be required to divide 24 by 4, the proportion is, as 4:1::24:6. Therefore set 4 upon B, to 1 upon A; and then against 24 upon B, is 6 upon A, which is the quotient sought.

**Problem IV.** Three numbers being given, to find a fourth in direct proportion.

**Rule.** Set the first number given upon B, to the second upon A, and then against the third number given upon B, is the fourth number sought upon A.

**Example.** If 8 quarters of malt will make 20 barrels of small beer, how many barrels of such beer will 22 quarters make?

Set 8 upon B, to 20 upon A; and then against 22 upon B, is 55 upon A; and so many barrels will 22 quarters make.

**Problem V.** To three numbers given, to find a fourth in an inverted proportion.

**Rule.** Set the third number upon A, to the first (being of the same denomination) upon B; and then against the second number upon A, you have the fourth upon B.

**Example.** If 8 men do any piece of work in 9 days, in how many days can 12 men do the same work?

Set 12 upon A, to 8 upon B; then against 9 upon A, is 6 upon B, which is the answer. For 12 men may do the same work in 6 days, which 8 men will do in 9 days.

**Problem VI.** Betwixt two numbers given to find a mean geometrical proportional.

**Rule.** Set one of the numbers given upon C, to the same number upon D; and then against the other given upon C, is the geometrical mean sought upon D.

**Example.** Let the numbers given be 50 and 72, to find a geometrical mean, &c.

Set 50 upon C, to 50 upon D; and then against 72 upon C, is 60 upon D; so 60 is the geometrical mean betwixt 50 and 72. Or thus, set 72 upon C, to 72 upon D; and then against 50 upon C, is 60 upon D, the mean as before.

To find the square or cube roots of any number, let the lines C and D for the first, and D and E for the second, be applied to one another, so that 10 at the end of D be even with 10 at the end of C; and 10 at the end of D be even with 10 at the end of E; the lines in this case

are like a table, shewing the square or cube roots of any number by inspection; for against any number upon C, you have the square root thereof upon D; and against any number upon E, you have the cube root thereof upon D: &c. *contra*.

*The use of the rule in measuring superficies: and first of a circle.*

**Problem I.** The diameter or circumference of a circle, either being given, to find the other. The circumference of that circle whose diameter is unity, is 3.1415926536; but for practice, the four first figures are sufficient; therefore, as 1:3.1415::the diameter of any circle to its circumference. By the rule thus, set 1 on the line A, against 3.1415 on B; then against any diameter on the line A, you have the circumference on B: &c. *contra*.

Against	$\left\{ \begin{array}{l} 20 \\ 30 \\ 40 \\ 50 \end{array} \right\}$	you have these circumferences	62.851
			94.247
			125.663
			157.079

Or contrariwise against these circumferences	$\left\{ \begin{array}{l} 20 \\ 30 \\ 40 \\ 50 \end{array} \right\}$	you have these diameters	6.366
			9.549
			12.732
			15.915

**Problem II.** The diameter of any circle being given, to find the area (or any part thereof) in inches, or in ale or wine-gallons. 1. For the whole area in inches.

The area of a circle is equal to the product, or rectangle, of half the diameter into half the circumference; that is, if half the diameter be multiplied by half the circumference, the product will be the area: thus, when the diameter is 1, the circumference is 3.1415, the half of which is 1.5707, which multiplied by half the diameter (*viz.* .5) the product will be the area of that circle, whose diameter is 1, *viz.* .785398.

The areas of all circles are in proportion one to another, as the squares of their diameters: therefore, as the square of the diameter of any circle is to the area of that circle, so is the square of the diameter of any other circle to the area thereof. Now as the square of 1 is but 1, is must be as 1:1.785398::square of the diameter of any circle to the area thereof. So .785398 is a fixed multiplier; and if an unit with cyphers be divided by .785398, the quotient will be 1.27324, a fixed divisor: and by either of these numbers may the area of any circle be found, either by multiplication or division. For if the squares of any diameter be multiplied or divided by these

numbers, the product or quotient will be the area in inches, feet, or yards, according as the diameter was measured in inches, feet, &c.

But with more expedition by the rule. Set 1 upon the line D, to .785398 upon C. The rule being thus set, the lines are like a table of circles, areas to all diameters; for against any diameter upon the line D, you have the area thereof upon C. Thus if the diameter is 20, the area is 314.159; if it is 25, the area is 490.87 inches. And on the contrary if the area is 300, the diameter is 19.54; if 400, the diameter is 22.56 inches.

The area in inches divided by 282, the cubic inches in an ale-gallon, or by 231 for wine-gallons, gives the area for either respectively; or you may use any other divisor, according to the measure you want. But without knowing the inches contained in any area, the area in gallons may be found thus: divide .785398 by 282, the quotient will be .0027851 ale-gallons; or by 231, if for wine-gallons, and it gives .0033999. These numbers are the areas of circles in ale and wine-gallons, whose diameters are 1; and are fixed multipliers for finding the area of all circles in either of these measures; for if the square of the diameter of any circle be multiplied by either of these numbers, the product is the area in ale or wine-gallons respectively. If you would effect this by division, the several divisors are thus found: multiply the divisor for finding the area in inches, *viz.* 1.27324, by 282, or 231, the products 359.05 for ale-gallons, and 294.11 for wine-gallons, are the divisors sought. And the square of the diameter of any circle divided by one of these, gives the respective area.

But the area of any circle may be more readily found by the help of fixed numbers, called gauge-points; and these numbers are the diameters of those circles whose content, at 1 inch deep, is equal to the respective gallon to which they belong. They are the square roots of the divisions last mentioned, that for A. G. 18.95, for W. G. 17.15, on the rule: thus, set 18.95 (the gauge-point for ale-gallons) upon D, to 1 upon C; then against any diameter upon D, you have the area upon C. The like for wine-gallons, by the proper gauge-point. Note, when the area of any circle is sought in ale-gallons, if the diameter be more than 18.95 and less than 100, set the gauge-

point upon D, to 1 at the beginning of C. Or when the diameter is less than the gauge-point, or more than 100, then set the gauge-point to 1, in the middle upon C. Lastly, to find any part of the area, set the gauge-point to  $\frac{1}{2}$ , or  $\frac{1}{3}$ , or any other part of 1, then against the diameter you have the like part of the area.

From what has been said, it will not be difficult to use the rule in gauging the areas of all right-lined figures; and when the area is found, the solidity is easily obtained. Thus, for example, the diameter, depth, and content of any cylindrical tun, any two being given, to find the third. In this problem are three questions, all resolved at once setting the rule: 1. By the depth and content to find the diameter. Example. Suppose the depth 40 inches, and the content 1800 ale-gallons, what is the diameter?

Set 40, the depth, upon C, to the gauge-point upon D; then against 1800, the content, upon C, is 127.1 inches, the diameter sought.

2. By the diameter and content, to find the depth, without moving the rule: say As 127.1, the diameter, is to 1800, the content; so is the gauge-point to 40, the depth,

$\left. \begin{array}{l} \text{D} \\ \text{C} \\ \text{D} \\ \text{C} \end{array} \right\} \text{upon}$

3. By the depth and diameter, to find the content, the rule standing as before: say, As the gauge-point is to 40, the depth, so is 127.1, the diameter, to 1800, the content,

$\left. \begin{array}{l} \text{D} \\ \text{C} \\ \text{D} \\ \text{C} \end{array} \right\} \text{upon}$

Note, as a circle is the base of a cylinder, so a triangle, quadrangle, or any other plane superficies, may represent the base of a prism: for if there be planes erected perpendicularly upon the lines which encompass any such superficies, they will generate a solid, which may be called a prism; and the content of any such solid is found by multiplying the area of the base by the altitude, or distance from one base to another.

*The use of the rule in GAUGING of malt.* The duty upon malt is charged upon the bushel, and so proportionably for greater or lesser quantities. The bushel here intended is the winchester-bushel, which contains 2150.42 solid inches, but 2150 will be near enough for practice.

If the area in inches, of any plane figure, be divided by 2150, the quotient shews the bushels and parts of a bushel, which such a figure or vessel contains at

one inch deep. Example. There is a cistern or vat, whose base is a rectangular parallelogram, the length is 72 inches, and the breadth 48 inches, what is the area, at 1 inch deep? Answ. 1.607, that is, 1 bushel and .607 thousand parts of a bushel; For 72 multiplied by 48, is 3456; and this divided by 2150, gives 1.607. But the area of any figure may be more readily found by the lines A and B, upon the rule: thus, as 2150 upon A, is to one of the sides upon B; so is the other side upon A, to the area upon B: so in the example above, set 2150 upon A, to 72 upon B; then against 48 upon A, is 1.607 upon B. Or set 2150 upon A, to 48 upon B; then against 72 upon A, is 1.607 upon B.

The area thus found, being multiplied by the mean depth in inches, gives the content of such a cistern at that depth and so for any quantity of malt upon the floor; but care must be taken in finding the mean depth of any quantity of malt, either in the cistern or upon the floor, by reason of the unevenness of the surface of the malt, and of the bottom of the cistern or floor upon which it was laid; in order to which, take the depth in 6, 8, or 10 places; and add all these depths together, and divide the sum by the number of places in which the depths were taken, the quotient will be the mean depth required. Barley is sometimes steeped in round vessels, and the area of a circle in bushels is thus found: take the diameter in inches; and let the square thereof be multiplied by .0003653, or divided by 2737.47, the product or quotient will be the area sought.

Example. Suppose the diameter of any vessel be 60 inches, this squared is 3600, and this multiplied by .0003653, or divided by 2737.47, gives 1.315, the area required.

But for any round vessel, the rule gives the area in bushels by inspection, by help of a certain number called the gauge-point, which in this case is 52.32 (being the diameter of a circle, whose area is 2150, the solid inches in a bushel). Thus in the example above, the diameter was 60 inches, therefore set the gauge-point (*viz.* 52.32) upon D, to 1 upon C; then against 60 upon D, is 1.315, the area upon C. And the rule being thus set against any diameter upon D, you have the area upon C.

But a cistern, couch, or floor-gauge may

be more speedily and expeditiously cast up by the line M D, signifying malt depth. On this line always find the depth of the cistern, couch, or floor; then say, as the depth upon the line M D, is to the length or breadth upon B, so is the length or breadth upon A, to the content in malt-bushels upon B. Example. Admit a floor whose length is 160, breadth 132, and depth 8.1 inches, what is the content in malt-bushels?

Operation by the rule.

Set the depth 8.1 on M D, to the length 160 on the line B; then against the breadth 132 upon A, you have 79.5 upon B, the content in malt-bushels. Thus,

M D.	B.	A.	B.
as 8.1 :	160 ::	132 :	79.5
Depth. Length. Breadth. Content.			

Or thus:

M D.	B.	A.	B.
as 8.1 :	132 ::	160 :	79.5
Depth. Breadth. Length. Content.			

GAULE, in botany, the same with myrica. See the article MYRICA.

GAUNT-BELLIED, in the manege, is said of a horse whose belly shrinks up towards his flanks.

GAUNTLET, or GANTLET. See the article GANTLET.

GAVOTTA, or GAVOTTE, is a kind of dance, the air of which has two brisk and lively strains in common time, each of which strains are played twice over. the first has usually four or eight bars, and the second contains eight, twelve, or more. The first begins with a minim, or two crotchets, or notes of equal value, and the hand rising; and ends with the fall of the hand upon the dominant or mediant of the mode, but never upon the final, unless it be a rondeau: and the last begins with the rise of the hand, and ends with the fall upon the final of the mode. See RONDEAU, DOMINANT, &c.

*Tempi di* GAVOTTA is when only the time or movement of a gavotte is imitated, without any regard to the measure, or number of bars or strains.

Little airs are often found in sonatas, which have this phrase to regulate their motions.

GAURS, in matters of religion, an ancient sect of the magicians in Persia. They have a suburb at Ispahan, which is called Gaurabad, or the town of the gaurs, where they are employed only in the meanest and vilest drudgery: but they chiefly abound in kerman, the barrenest province

vince in all Persia, where the mahometans suffer them to live with some freedom, and in the full exercise of their religion. Some years ago many of them fled into India, where their posterity remain to this day.

They are a poor harmless sort of people, zealous in their superstition, rigorous in their morals, and exact in their dealings: they profess the worship of one God alone, the belief of a resurrection, and a future judgment, and utterly detest all idolatry, though the mahometans believe them to be the most guilty of it. It is true, they perform their worship before fire, for which they have an extraordinary veneration, as believing it to be the most perfect emblem of the deity. They have the same veneration for Zoroaster that the Jews have for Moses, esteeming him a prophet sent from God.

**GAWSE, or GAWZE**, in commerce, a very slight, thin, open kind of stuff, made of silk, and sometimes of thread; there are also figured gawzes, and some with gold or silver flowers on a silk ground.

**GAZE-HOUND, or GAST-HOUND**, one that makes more use of his sight than of his nose. Such dogs are much used in the north of England: they are fitter in an open champain country, than in bushy and woody places. If at any time a well-taught gaze-hound takes a wrong way, he will return upon a signal and begin the chase afresh. He is also excellent at spying out the fattest of a herd, and having separated it from the rest, will never give over the pursuit till he has worried it to death.

**GAZELLA**, in zoology, the name of several species of goat: as, 1. The african gazella, called also antelope and dorcas lybica, the horns of which are cylindric and half way arched. 2. The indian gazella, or antelope, with very long, cylindric, and straight horns, annulated at the base. 3. Another species of african gazella, with cylindric, arched, and perfectly annulated horns. This last is a small, but very beautiful species, and greatly resembles the common deer in shape: the horns, which arise from the middle of the forehead, are of a beautiful black colour, and annulated all the way from the base to the very tips. See a figure of it in plate CXIII. fig. 1.

**GAZETTE**, a news-paper, or printed account of the transactions of all the countries in the known world, in a loose sheet or half sheet. This name is with us con-

fined to that paper of news published by authority.

The word is derived from gazetta, a venetian coin, which was the usual price of the first news-paper printed there, and which was afterwards given to the paper itself.

**GAZONS**, in fortification, pieces of fresh earth, covered with grass, and cut in form of a wedge, about a foot long and half a foot thick, to line the outides of works made of earth, as ramparts, parapets, &c. The first bed of 'gazons is fixed with pegs of wood; the second bed should be so laid as to bind the former, by being placed over its joints; and so continued till the works are finished. Betwixt these beds it is usual to sow all sorts of binding herbs, in order to strengthen the rampart.

**GEAR, or About your GEAR**, in the sea-language, a word of command to work on all hands.

**GEASTER**, a name given by Micheli to the lycoperdon. See LYCOPERDON.

**GED**, a bird otherwise called juddock. See the article JUDDOCK.

**GEERS, or CHAINS**, in country-affairs, the trappings and other harness belonging to draught-horses or oxen.

**GEESE**, in ornithology. See GOOSE.

**GEHENNA**, a term mentioned in several parts of scripture, which our english translators have rendered hell. See HELL.

**GELÆOPACHIA**, in natural history, a class of mineral inflammable fluids, of a thicker consistence, and opaque; such is pissasphaltum. See PISSASPHALTUM.

**GELÆOSPILA**, another class of inflammable mineral fluids, of a thinner consistence, and pellucid: such is naphtha. See the article NAPHTHA.

**GELATINOUS**, in pharmacy and medicine, any thing approaching to the glutinous consistence of a gelatina, or jelly. See the article JELLY.

**GELD**, in our old customs, a saxon word signifying money, or tribute: also a compensation for some crime committed. See the article GILD.

Hence wergeld, in our antient laws, was used for the value of a man slain; and orfgeld, of a beast. See ORFGELD.

**Foot-GELD**. See the article FOOT-GELD.

**Horn-GELD**. See the article HORN-GELD.

**Wood-GELD**. See WOOD-GELD.

**GELDABLE LANDS, &c.** See TAXABLE.

**GELDERLAND**, comprehending Zutphen, is a province of the united Netherlands, bounded by the Zuider-sea and Overysse on the north, by Westphalia on the



the east, by Brabant on the south, and by the province of Utrecht on the west.

**GELDER-ROSE**, the name by which some call the opulus, or water-elder.

**GELDING**, the operation of castrating any animal, particularly horses.

This operation consists in cutting out the testicles; in performing which, three things are to be observed: first, regard is to be had to their age; next, to the season of the year; and, lastly, to the state of the moon. For the first, if the operation is to be performed on a colt; he may be gelded at nine or at fifteen days old, if the testicles be come down, in regard the sooner he is gelt the better it will be for his growth, shape, and courage; though a horse may be gelt at any age, if proper care be taken in the cure. As for the second, the best time is about April or May, or else about the latter end of September. And for the third, the wane of the moon is the fittest time for performing this operation.

The manner of gelding is as follows: the beast being calt down on some soft place, the operator takes the stones between his foremost and his great finger, and slitting the cod, presses the stones forth; then taking a pair of nippers, made very smooth, either of steel, box, or brasil-wood, he claps the strings of the stones between them, very near to where the stones are set on, and presses them so hard, that there may be no flux of the blood; then, with a thin, drawing cauterizing iron, made red-hot, sears away the stone.

This done, he takes a hard plaster made of rosin, wax, and washed turpentine, well dissolved together, and melts it on the head of the strings: that being done, he sears them, and melts more of the salve, till such time as he has laid a good thickness of it upon the strings.

This being done to one stone, the nippers are loosened, and the like is done to the other; and the two slits of the cod are then filled with whitesalt, and the outside of the cod is anointed with hogs-grease; and thus they let him rise, and keep him in a warm stable, without tying him up.

If he swells much in his cods or sheath, they chase him up and down; and make him trot an hour in a day, and he soon recovers.

The manner of gelding a hog is as follows: the operator, after having made two cross slits, or incisions, on the midst

of the stones, presses them out, and anoints the sore with tar. But another more general method, yet somewhat more dangerous, if not well done, is first to cut the stone on the top, and after having drawn that one forth, the operator puts in his fingers at the same slit, and, with a lancet, cuts the skin between the two stones, and by that slit presses out the other stone. Then having cleansed out the blood, he anoints the part with fresh grease: and thus there is but one incision made in the cod. Boar-pigs ought to be gelt about six months old; yet they are commonly gelded about three weeks or a month old.

**GELDING of a lamb** may be performed from the age of three days to three weeks or more, in the following manner: one is to hold the lamb between his legs, or in his lap, and turn him on his back, holding his fore-feet upright together (but if any black spots are seen in his flank, he must not be cut at all), then the cutter holding the tip of the cod in his left hand, cuts the lap of it an inch quite away; which done, he, with the foremost fingers and thumbs of both hands, should softly slip down the cod over the stones, to the belly, and with his teeth, holding the left stone in his mouth, he draws it softly out the length of the string; after which he is to draw out the other stone in the same manner; then he spits in the cod, and anoints the lamb's flanks with fresh grease, and so lets him go, and keeps stirring him up and down for two or three hours.

**GELDRES**, a city of Gelderland, situated twenty-three miles south of Nimeguen: east longit.  $6^{\circ} 8'$ , and north lat.  $51^{\circ} 35'$ .

This city, with the territory about it, was yielded to the king of Prussia, by the treaty of Utrecht.

**GELLENHAUSEN**, an imperial city of Germany, governed by its own magistrates; it is situated nine miles north of Hanau: east longit.  $8^{\circ} 50'$ , and north lat.  $50^{\circ} 15'$ .

**GELOSCOPY**, a kind of divination drawn from laughter; or a method of knowing the qualities and character of a person, acquired from the consideration of his laughter.

**GEM, gemma**, in natural history, a common name for all precious stones, of which there are two classes, the pellucid and semipellucid.

The bodies composing the class of pellucid gems are bright, elegant, and beautiful fossils, naturally and essentially compound, ever found in small detached masses, extremely hard, pellucid, and of great lustre; composed of a very firm and pure matter, without any admixture of earthy substance, giving fire with steel, not fermenting with acid menstruums, and very difficultly calcinable in the fire. Of this class there are two genera, the chroastasma, and the chroastaces. See **CHROASTASIMA** and **CHROASTACES**.

The bodies composing the class of semipellucid gems, are stones naturally and essentially compound, not inflammable nor soluble in water, found in detached masses, and composed of crystalline matter, debased by earth: however, they are but slightly debased, and are of great beauty and brightness, of a moderate degree of transparency, and are usually found in small masses.

Of this class there are two orders: the first of which consists of the semipellucid gems, of but two variegations, and frequently of one plain, simple colour; tho' sometimes veined: this order contains four genera, *viz.* the sardæ, the chalcédonies, the hydrophanæ, and the pramnian. See the articles **SARDAE**, **CHALCEDANII**, **HYDROPHANÆ**, and **PRAMNION**.

The second order of semipellucid gems, consisting of those remarkable for their veins, zones, and variegations, contains also four genera, *viz.* the achatæ, the onyches, the sardoniches, and the cameæ. See the articles **ACHATÆ**, **ONYCHES**, **SARDONYCHES**, and **CAMEÆ**.

Many authors, not only among the ancients but the moderns, are full of the virtues and medicinal properties of precious stones; but their reputation, in this respect, is now not a little fallen. Yet as the fragments of such stones are still preserved by the physicians in some of the most celebrated compositions, as there are certain chemical preparations made of them, as several persons of the greatest candour and experience have related many considerable effects of certain gems, on their own particular observations, and, lastly, as it is no way improbable that some of the softer stones may have some considerable operations on the human body, it might be imprudent indiscriminately to exclude from them any medicinal virtue at all. When much the greater part of their traditional quali-

ties are set aside as fabulous, there will remain some on as real and well warranted a footing, as many of our other medicines.

On such considerations the excellent Mr. Boyle was induced to give us that extraordinary piece of the origin and virtues of gems, the purport whereof is to shew, that such stones were originally in a fluid state, or are made up of such substances as were formerly fluid; and that many of their general virtues are probably derived from the mixture of metalline and other mineral substances, usually incorporated with them; while the great variety and the particular efficacy of their virtues, arise from some happy concurrent substances of that commixture, *e. g.* the peculiar nature of the impregnating liquor, the proportion wherein it is mixed with the petrescent juice, and the like.

To support this hypothesis of the virtues of gems, he shews, that several of them are not simple concretions of any petrescent liquors, but consist also of other adventitious parts, which he argues from the separableness of such substances in some stones, the specific gravity in others, and the different tinctures to be met with in gems of the same species. There may, therefore, be in some gems numberless adventitious corpuscles; and there is reason to think, that some of these corpuscles may be endued with several properties and medicinal virtues.

The stress of what is objected to them is this: the mineral substances they contain are so closely locked up, that they can communicate nothing to the body, and so can have no medicinal operation; being unconquerable by so small a heat, as that of the stomach, and other parts of the body.

This objection might be plausible enough to prevent the ascribing any medicinal virtues to them, *a priori*, but can conclude nothing against what is warranted by so many facts and observations, especially when there are several particulars that obviate this objection. For a vigorous loadstone, though frequently harder than many gems, is known to emit copious effluvia; and there are many which have been found to have a manifest and inconvenient operation on the body, by being wore in the pocket, or long held in the hand.

“The hydrostatical ballance, says Mr. Boyle, is of prime use in discerning  
“genuine

“ genuine gems from counterfeits, which  
 “ but too often pass for true, to the  
 “ prejudice of physicians and their pa-  
 “ tients, and the loss of lapidaries: for  
 “ as there are, perhaps, no qualities of  
 “ bodies more essential than their pon-  
 “ derosity, so there is scarce any where-  
 “ in impostures find more difficulty to  
 “ make a notable alteration without be-  
 “ ing discovered.” See the article *HY-  
 DROSTATICAL BALANCE*.

*Imitation or counterfeiting of GEMS in glass.*

The art of imitating gems in glass, is too considerable to be passed without notice; some of the leading compositions therein, we shall briefly mention upon the authority of Neri. See *GLASS*.

These gems are made of pastes, and are no way inferior to the native stones, when carefully made and well polished, in brightness or transparency, but want their hardness. See the article *PASTE*.

The general rules to be observed in making the pastes, are these. 1. That all the vessels in which they are made be firmly luted, and the lute left to dry before they are put into the fire. 2. That such vessels be chosen for the work, as will bear the fire well. 3. That the powders be prepared on a porphyry-stone, not in a metal mortar, which would communicate a tinge to them. 4. That the just proportion in the quantity of the several ingredients be nicely observed. 5. That the materials be all well mixed, and if not sufficiently baked the first time, to be committed to the fire again, without breaking the pot: for if this be not observed, they will be full of blisters and air-bladders. 6. That a small vacuity be always left at the top of the pot, to give room to the swelling of the ingredients.

To make paste of extreme hardness, and capable of all the colours of the gems, with great lustre and beauty. Take of prepared crystal, ten pounds; salt of polverine, six pounds; sulphur of lead, two pounds; mix all these well together into a fine powder; make the whole with common water into a hard paste; and make this paste into small cakes, of about three ounces weight each, with a hole made in their middle; dry them in the sun; and afterwards calcine them in the straightest part of a potter's furnace. After this, powder them, and levigate them to a perfect fineness on a porphyry, and set this powder in pots in a glass-furnace to purify for three days: then cast

the whole into water, and afterwards return it into the furnace, where let it stand fifteen days, in which time all foulness and blisters will disappear; and the paste will greatly resemble the natural jewels. To give this the colour of the emerald, add to it brass thrice calcined; for a sea-green, brass simply calcined to a redness; for a sapphire, add zaffer, with manganese; and for a topaz, manganese and tartar. All the gems are thus imitated in this by the same way of working as the making of coloured glasses; and this is so hard, that they very much approach the natural gems.

The colour of all the counterfeit gems made of the several pastes, may be made deeper or lighter, according to the work for which the stones are designed; and it is a necessary general rule, that small stones for rings, &c. require a deeper colour, and large ones, a paler: besides the colours made from manganese, verdigrease, and zaffer, which are the ingredients commonly used, there are other very fine ones which care and skill may prepare. Very fine red may be made from gold, and one not much inferior to that from iron: a very fine green from brass or copper; a sky-colour from silver; and a much finer one, from the granates of Bohemia.

*GEMARA*, in Jewish antiquity, a collection of decisions and determinations on the law, wrote after the Mishna was completed.

It was called gemara, or perfection, because it was considered as so perfect an explication of the law, that after it no farther additions could be made, or any thing more desired. It is otherwise called the talmud. See *TALMUD*.

*GEMATRIA*, or *GEMATRIE*, in Jewish antiquity. See the article *CABBALA*.

*GEMBLOURS*, a town of the Austrian Netherlands, in the province of Brabant, situated on the river Orne, ten miles north-west of Namur: east long. 4° 30', and north lat. 50° 30'.

*GEMELLES*, in heraldry. See the article *BAR-GEMEL*.

*GEMELLUS*, in anatomy, the name of two muscles, both of which are small, flat and narrow, and situated almost transversely one above the other, between the tuberosity of the ischium and the great trochanter, immediately below the pyramiformis, and parted by the tendon of the obturator internus.

The superior and smallest gemellus is fixed

fixed to the lower part of the spine of the ischium, to the superior part of the small ischiatic notch, and is continued under the acetabulum where it is bent downwards. The inferior and largest gemellus, is fixed to the superior and back part of the tuberosity of the ischium, and bending upwards towards the other line, together with it forms a sort of irregular semicircle.

**GEMINATED COLUMN.** See the article **COLUMN**.

**GEMINI**, the **TWINS**, in astronomy, one of the twelve signs of the zodiac, the third in order, beginning with aries. See the articles **SIGN** and **ZODIAC**. This constellation, according to different authors, contains from 24 to 89 stars. It is represented by the figure of two twin-children, looking each other affectionately in the face, and supposed to be Castor and Pollux.

**GEMMA**, *gem*, in natural history. See the article **GEM**.

*Sal* **GEMMÆ**, is the purest and finest fossil salt, and an extremely bright and beautiful fossil. It is considerably hard and firm, and at least as pellucid as rock crystal; but is frequently coloured throughout with a milky-white, which takes off greatly from its lustre; and as crystal is liable to be tinged with red, green and yellow, so as to resemble rubies, sapphires, emeralds, and topazes, so this salt is sometimes tinged with these several colours; but rarely preserves the transparency of crystal under the same circumstances. See the article **SALT**.

**GEMONIÆ SCALÆ**, in roman antiquity, a place for executing criminals, not unlike Tyburn with us. It was situated on the Aventine mount, or tenth region of the city; and was, according to some, a place raised on several steps, from whence they precipitated the criminals. But others will have it to have been a kind of dungeon, to which they descended by steps.

**GEMOTE**, a term used in old laws-books for a court. See the article **MOTE**.

**GEMUND**, a town of Germany, in the circle of Westphalia, and dukedom of Juliers, situated on the river Roer: east long.  $6^{\circ} 15'$ , and north lat.  $50^{\circ} 34'$ .

**GEMUND**, a town of Germany, in the circle of Swabia, and county of Rechsberg, situated on the river Rems: east long.  $9^{\circ} 40'$ , and north lat.  $48^{\circ} 45'$ .

**GEMUND**, a town of Germany, in the circle of Franconia, situated on the river

Maine: east long.  $9^{\circ} 45'$ , and north lat.  $50^{\circ} 8'$ .

**GENA**, the **CHEEK**, in anatomy, that part of the face between the nose and the ears. See the article **FACE**, &c.

**GENÆ QUADRATUS.** See **QUADRATUS**.

**GENAP**, a town of Brabant, situated on the river Dyle, fourteen miles south-east of Brussels.

**GENDARMES**, or **GENS D'ARMES**, in the french armies, a denomination given to a select body of horse, on account of their succeeding the antient gendarmes, who were thus called from their being completely clothed in armour.

The king's body guards, the light horse of the royal house, and the musqueteers, are at present reputed to belong to the gendarmerie.

The grand gendarmes are a troop composed of about 250 gentlemen, who guard the king's person. The king himself is their captain, and one of the prime peers their captain-lieutenant, who has under him two lieutenants, three ensigns, three guidons, and other officers. There are besides these, gendarmes of the queen, the dauphin, &c.

**GENDER**, *genus*, among grammarians, a division of nouns, or names, to distinguish the two sexes. See **NOUN** and **SEX**.

This was the original intention of gender; but, afterwards, other words which had no proper relation, either to the one sex or the other, had genders assigned them, rather out of caprice than reason; which is at length established by custom. Hence genders vary according to the languages, or even according to the words introduced from one language into another. Thus *arbor*, in latin, is feminine; but *arbre*, in french, is masculine: and *dens*, in latin, is masculine; but *dent*, in french, is feminine. Nay, a gender has sometimes changed in the same language, according to time and occasion. Thus *alvus*, according to Priscian, was antiently masculine, but afterwards became feminine; and *navire*, was antiently feminine in french, but is now masculine. In english we have no genders; indeed we express the difference of sex by different words; as boar, sow; boy, girl, &c. We have also twenty-four feminines distinguished from the males by varying the termination of the female into *ess*; as actor, actress; prince, princess; heir, heiress, &c. and we have a few words in which the feminine is distinguished from the masculines by the termination *ix*, as executor,

executor, executrix ; administrator, administratrix, &c. which is all our language knows of any thing like genders.

The eastern languages, as well as the vulgar languages of the west, have only two genders, the masculine and the feminine. The greek and latin have besides, the neuter, common, and doubtful gender. This last indeed is not common, for it properly belongs only to the names of some animals, which are promiscuously joined both to masculine and feminine adjectives, to express their male or female, as *bos*, *canis*, *fus*, &c. They have also the epicene gender, which is not a different one, but serves promiscuously for either ; including both the kinds under one single gender and termination : thus *vulpes*, a fox, tho' it signifies either the male or female, is really of the feminine gender, in latin. And so *custodie*, watchmen or centinels, are really feminine, tho' they signify men. This is common to all languages that have them. The latin and greek, in the neuter gender, do not regard them, having no relation to the male or female sex, but what fancy gives them, and the termination of certain words.

The oriental languages frequently neglect the use of genders ; and the persian language has none at all, which is no disadvantage ; the distinction of genders being entirely useless.

**GENEALOGICA ARBOR**, or tree of consanguinity, signifies a genealogy or lineage drawn out under the figure of a tree, with its root, stock, branches, &c.

The genealogical degrees are usually represented in circles, ranged over, under, and aside each other. This the Greeks called *stemmata*, a word signifying crown, garland, or the like.

**GENEALOGY**, *γενεαλογια*, an enumeration of a series of ancestors ; or a summary account of the relations and alliances of a person or family, both in the direct and collateral line.

**GENEP**, a town in the dutchy of Cleeve, in Germany, situated on the Nierse and Maese, ten miles west of Cleeve : east long.  $5^{\circ} 30'$ , and north lat.  $51^{\circ} 40'$ .

**GENERAL**, an appellation given to whatever belongs to a whole genus. See **GENUS**. Thus we say, general geography, diet, council, averment, issue, &c. See the articles **GEOGRAPHY**, **DIET**, &c.

**GENERAL OFFICERS**, in the army. See the article **OFFICER**.

**GENERAL TERMS**, among logicians, those which are made the signs of general ideas. See **IDEA** and **ABSTRACTION**.

All things that exist, Mr. Locke observes, being particulars, it might be expected that words should be so too in their signification : but we find it quite contrary ; for most of the words that make all languages are general terms. This is the effect of reason and necessity. For, First, It is impossible that every particular thing should have a distinct name, because it is impossible to have distinct ideas of every particular thing ; to retain its name, with its peculiar appropriation to that idea.

Secondly, It would be useless, unless all could be supposed to have these same ideas in their minds. For names applied to particular things, whereof I alone have the ideas in my mind, could not be significant or intelligible to another, who is not acquainted with all those particular things which had fallen under my notice.

Thirdly, It would be of no great use for the improvement of knowledge : which, tho' founded in particular things, enlarges itself by general views ; to which things, reduced into sorts under general names, are properly subservient.

In things where we have occasion to consider and discourse of individuals and particulars, we use proper names : as in persons, countries, cities, rivers, mountains, &c. Thus we see that jockeys have particular names for their horses, because they often have occasion to mention this or that particular horse, when he is out of sight.

Afterwards, observing that a great many things resemble each other in shape, and other qualities, we frame a general idea that takes in only the qualities in which those many particulars agree ; and to this idea we give the name *man*, for example, in which there is nothing new ; that which is peculiar to each individual being left out, and only what is common to all retained. And thus we come to have a general idea, and a general name. By the same method the mind proceeds to more general notions and names, as those of animal, substance, being, thing, and such universal terms as stand for any ideas whatsoever.

As to the signification of general words, it is evident they do not barely signify one particular thing ; neither do they signify

a plurality. But they signify a genus, kind, or sort of things. See the articles ABSTRACTION and GENUS.

**GENERAL** of an army, in the art of war, he who commands in chief. See ARMY. A general ought to be a man of great courage and conduct, to have great experience, and to be of good quality. His conduct appears in establishing his magazines in convenient places ; in examining the country, that he may not engage his troops too far, while he is ignorant of the means of bringing them off ; in subsisting them ; and in knowing how to take the most advantageous posts, either for fighting or shunning a battle. His experience inspires his army with confidence, and an assurance of victory ; and his quality, by creating respect, augments his authority. By his liberality he gets intelligence of the strength and designs of the enemy, and by this means is enabled to take the most successful measures. A general ought likewise to be fond of glory, to have an aversion to flattery, to render himself beloved, and to keep a strict discipline.

The office of a general is to regulate the march and encampment of the army ; in the day of battle to choose out the most advantageous ground ; to make the disposition of the army ; to post the artillery ; and where there is occasion, to send his orders by his aids de camp. At a siege, he is to cause the place to be invested ; to order the approaches and attacks ; to visit the works, and to send out detachments to secure his convoys.

**GENERAL** of horse, and **GENERAL** of foot, are posts next under the general of the army, and these have upon all occasions an absolute authority over all the horse and foot in the army.

**GENERAL** of the artillery, or **Master GENERAL** of the ordnance. See ORDNANCE.

**GENERAL** is also used for a particular march, or beat of drum ; being the first which gives notice, commonly in the morning early, for the infantry to be in readiness to march.

**GENERAL** is also used for the chief of an order of monks ; or of all the houses and congregations, established under the same rule. Thus we say, the general of the Franciscans, Cistercians, &c.

**GENERATING LINE**, or **FIGURE**, in geometry, is that which by its motion produces any other plane or solid figure. Thus, a right line moved any way parallel to itself, generates a parallelo-

gram ; round a point in the same plane, with one end fastened in that point, it generates a circle. One entire revolution of a circle, in the same plane, generates the cycloid ; and the revolution of a semi-circle round its diameter, generates a sphere, &c. See the articles CYCLOID, SPHERE, &c.

**GENERATION**, *generatio*, in physiology, the act of procreating and producing a thing which before was not ; or, according to the schoolmen, it is the total change or conversion of one body into a new one, which retains no marks of its former state. Thus, we say, fire is generated, when we perceive it to be where before there was only wood, or other fuel : in the same manner, a chick is said to be generated, when we perceive it where before there was only an egg ; or, the egg is changed into the form of a chick.

In generation, there is not properly any production of new parts ; but only a new modification, or manner of existence, of the old ones.

When almighty God, says Dr. Blair, created the world, he so ordered and disposed of the materies mundi, that every thing produced from it should continue so long as the world should stand. Not that the same individual species should always remain ; for they were in process of time to perish, decay, and return to the earth from whence they came ; but that every like should produce its like, every species produce its own kind, to prevent a final destruction of the species, or the necessity of a new creation. For which end he laid down certain regulations, by which each species was to be propagated, preserved, and supported, till, in order and course of time, they were to be removed hence : for without that, those very beings, which were created at first, must have continued to a final dissolution of all things ; which almighty God of his infinite wisdom, did not think fit. But that he might still the more manifest his omnipotence, he set all the engines of his providence to work, by which one effect was to produce another, by means of certain laws or rules, laid down for the propagation, maintenance, and support of all created beings. This his divine providence is called nature, and these regulations are called the laws or rules of nature, by which it ever operates in its ordinary course ; and whatever recedes from that,

is said to be preternatural, miraculous, or monstrous.

**GENERATION of animals.** According to Aristotle, the males contain the principle, and the females the matter of generation: for though both were furnished indeed, with a feminal liquor, yet the semen of the males alone was prolific. The moderns, on the other hand, as well those who contend for the system of generation from eggs, as they who adopt that of the animalcules in the male-seed, pretend that females have no such feminal liquor at all, and that what was commonly taken for it was some other animal fluid.

There are great and many difficulties which attend the most plausible account of the first formation of the parts of an animal, and the beginning of motion in its fluids: for though both reason and experience convince us, that all the parts of an animal did exist before generation; yet how this matter comes to assume so very different a form, as that of an embryo, is by no means agreed on.

Harvey is of opinion, that all females are furnished with eggs, and that the embryos, or young animals, are formed in the same manner as a chick in the egg of any bird. Generation, according to this celebrated physician, is effected wholly by means of the uterus, or womb; which conceives the foetus by a kind of contagion communicated to it by the male-seed, much in the same way as the load-stone communicates magnetism to iron. This contagion, he thinks, acts not only on the uterus, but is communicated to the whole body of the female, which is altogether prolific; though the uterus, he acknowledges, is the only part that is capable of conceiving the foetus, just as the brain is alone capable of forming ideas and notions. Agreeably to this doctrine of Harvey, Steno, and other anatomists, have pretended to discover certain eggs in the ovaries or testicles of women; which Mr. Buffon denies to be the case, affirming, that there are no such eggs to be found in the testicles or ovaries of women.

We cannot enter into a detail of the reasonings for and against the system of generation from eggs, and shall therefore only observe, that its advocates pretend to have discovered eggs in all the females on which they made observations, that the largest of those found in women did

not exceed the bigness of a pea; that they are extremely small in young girls under fourteen, but that age and commerce with men makes them grow larger; that there are more than twenty such eggs in each ovary or testicle; that they are fecundated in the ovary by the spirituous and volatile part of the male-seed; that they afterwards are detached and fall into the uterus through the fallopian tubes; that here the foetus is formed of the internal substance of the egg, and the placenta of the exterior part. See the article **FOETUS**.

Leewenhock is the author of another system of generation, from animalcules in the male seed. He tells us, he discovered many thousands of these in a drop less than a grain of sand. They are found in the semen of all males whatever, but not in that of females; and are so small, that 3,000,000,000 of them are not equal to a grain of sand, whose diameter is but the hundredth part of an inch. When any of these animalcules gets into an egg, fit to receive it, and this falls into the womb through the fallopian tubes, the humours which distil through the vessels of the womb, penetrating the coats of the egg, swell and dilate it, as the sap of the earth does seed thrown into it. The placenta begins to appear like a little cloud, upon one side of the external coat of the egg; and, at the same time, the spine of the embryo-animalcule is grown so big, as to become visible; and a little afterwards, the cerebrum and cerebellum appear like two bladders; and the eyes stand next goggling out of the head; then the beating of the heart or *punctum saliens*, is plainly to be seen; and the extremities discover themselves last of all.

These animalcules are of different figures, some like tadpoles, and others like eels. In the semen of a man, and in that of a dog, there have been discovered two different kinds of them, the one supposed to be males, and the other females. Some even pretend to have seen animalcules disengage themselves from the membranes that surround them; and that they then appeared perfectly like men, with legs, arms, &c. like those of the human body.

All the advocates for the system of generation from animalcules strongly oppose that from eggs. They contend, that these animalcules cannot be looked





but was lost by alliances with those who had but the usual number of fingers or toes.

He farther observes, that most animals, excepting mankind, have stated seasons for procreation, and that the females go with young some a longer, others a shorter time. Mares go from eleven to twelve months; cows and hinds go nine months, as do also women; foxes and wolves, five months; and bitches go only seven weeks; cats nine weeks; and rabbits but thirty-one days. Most birds are hatched in twenty-one days; the canary birds, and some others, are hatched in thirteen or fourteen days. It appears, therefore, that there is an endless variety in the time and manner of the generation of animals.

Those who desire a more full account of these systems of generation may consult Harvey, Leewenhoek, Buffon, &c.

*Parts of GENERATION.* The parts of generation, in men, are the testicles, vasa deferentia, vesiculæ seminales, and penis. See the article *TESTICLE*, &c.

Those, in women, are the pudendum or vulva, the clitoris, nymphæ, vagina, uterus or womb, ovaries, and fallopian tubes. See the articles *PUDENDUM*, *CLITORIS*, &c.

*GENERATION of Fishes.* The opinion of most naturalists, that the female fishes first deposit their spawn, and that the males afterwards eject the semen upon it, is denied by Linnæus; who thinks it impossible, that the eggs of any animal should be impregnated out of its body. He thinks it much more probable, that the males always eject their semen some time before the females deposit their spawn; and that by swallowing this semen, the spawn is impregnated in the body of the fish. Nay, he tells us, that he himself saw three or four females, in the spawning time, gather about the male, and greedily swallow the semen he ejected. This he observed in some species of the eel, perch, and especially the cyprinus; but he recommends farther enquiry to be made on this subject.

*GENERATION of Insects*, no less than that of birds, is now certainly known to be from eggs; which the female deposits in places, where, at a proper season, they are hatched into animals like their parents; or into maggots, or worms, which, after several transformations, at last appear in the form of their parents. See *INSECT*, *TRANSFORMATION*, &c.

*Extraordinary GENERATION.* Such is that of polypes, from cuttings or pieces of another polype. See *POLYPE*.

*GENERATION of plants.* The impregnation of the female palm-tree by the male, has been known in the most ancient times. Herodotus, the father of history, tells us, that the Greeks called some of these trees male, the fruit of which they bound to the other kind, which bears dates; that the small flies, wherewith the male abounded, might assist in ripening the fruit of the female-tree. The remote age in which Herodotus wrote, sufficiently apologizes for his believing, that what was really brought about by the farina fecundans of the male-flower, was to be attributed to the insects frequently found therein, and which perhaps frequently carry this farina from the male to the female. The process of impregnation, according to Theophrastus, was this: while the male plant was in flower, they cut off a branch of these flowers, and scattered the dust and down therein upon the flowers of the female plant; by which means the female did not cast her fruit, but preserved them to maturity. This has been lately verified at Berlin, where a female palm-tree bore fruit for many years; but the fruit never ripened, and when planted, did not vegetate, merely because there was no male palm in the place: for having procured a branch of male flowers from Leipzig, twenty german miles from Berlin, they suspended it over the female flowers of their tree; and the experiment succeeded so well, that the female tree produced more than an hundred perfectly ripe fruit; and the experiment being repeated, it bore above two thousand ripe fruit, which being planted produced young trees.

It is in the flowers of vegetables only, that the parts subservient to generation are produced; and these flowers are either male, female, or hermaphrodite. male-flowers are those possessed of the organs of generation, analogous to the male parts of animals: such are the stamina and apices, called by Linnæus, filaments and antheræ. The female flowers are only endowed with parts like those, which perform the office of generation in females; and these are the pistil and its appurtenances, which Linnæus divides into three parts, the germen, style, and stigma. The hermaphrodite flower, which constitutes the great bulk

of the vegetable creation, is possessed of all these parts in itself, and is therefore capable of propagating its species without any foreign assistance; which, by many incontestable experiments, it has been found neither the male nor female flower simply is able to do. The impregnation of hermaphrodite flowers, may be performed within their own calyx; but, before a separate female flower can be so, the farina fecundans of the male flower must necessarily be conveyed to it thro' the circumambient air; which is the reason, why the quantity of the produce of such plants is much more precarious, than that of plants which have hermaphrodite flowers: for if, during the flowering of these separate male and female plants, the weather proves either very wet or stormy, their produce of fruit will be very inconsiderable, from the spoiling or hasty dissipation of the male farina. Thus, independent of frosts, the fruit of the nut and filbert-tree will be most numerous in those years, in which the months of January, and February are the least stormy and wet, because at that time their flowers are produced. For the same reasons, a stormy or wet May destroys the chestnuts; and the same weather, in July, prodigiously lessens the crop of maize, or indian corn, as its spikes of male-flowers stand lofty, and at a considerable distance from the female.

Some of the more skilful modern gardeners put in practice, with regard to melons and cucumbers, the very method mentioned by Theophrastus two thousand years ago, in regard to the palm-tree. As these plants, early in the season, are in this climate confined to frames and glasses, the air in which they grow is more stagnant than the open air; whereby the distribution of the farina fecundans, so necessary towards the production of the fruit for the propagation of the species, is much hindered. To obviate the inconvenience thence arising, they collect the male-flowers when fully blown; and presenting them to the female ones by a stroke of the finger, they scatter the farina fecundans therein, which prevents the falling of the fruit before it is ripe.

By far the greater part of plants produce hermaphrodite flowers; but some there are which have separate male and female-flowers growing from the same root, as maize, nettles, box, elm, birch,

oak, beech, hazel, hornbeam, plane-tree, pine, fir, cypress, cedar, melons, cucumbers, gourds, and several others: in many of these, the male and female flowers stand at a considerable distance. There are other plants which produce those necessary organs upon different roots, as the palm-tree, hops, the willow-tree, missetoe, spinach, hemp, poplar, french and dog's mercury, the yew-tree, juniper, and several others. Among these, the valisneria of Linnæus, as to the manner in which its male-flower impregnates the female, is one of the most singular prodigies in nature. It grows in rivulets, ditches, and ponds, in many parts of Europe. The male plant, which is continually covered with water, has a short stalk, upon the top of which its flowers are produced. As this top never reaches the surface of the water, the flowers are thrown off from it, and come unopened to the surface of the water; where, as soon as they arrive, by the action of the air, they expand themselves, and swim round the female flowers, which are blown at the same time. These last have a long spiral foot-stalk, by which they attain the surface of the water, and remaining there in flower a few days, are impregnated by the male-flowers detached from the stalk at the bottom.

It is observable, that the operations of nature are carried on most usually by certain general laws, from which however she sometimes deviates. Thus almost all plants have either hermaphrodite flowers, or male and female flowers, growing from the same root, or male and female flowers from different roots; but there are a few of another class, which from the same root furnish either male and hermaphrodite flowers, or female and hermaphrodite ones: of this kind are the mulberry-tree, the musk or plantain-tree, white hellebore, pelltory, arrach, the ash-tree, and a few others. *Watson*, in *Phil. Transf.* Vol. 47, p. 169—183.

Some object to this theory of the generation of plants, from having observed some plants, which were termed female, growing singly; and though at a very great distance from any male plants of the same kind, producing perfect fruits, which grew when sown. Mr. Miller tells us, he himself was staggered in his opinion, on having observed a female plant of white briony, which grew singly

In a garden, where there were no other plants of the same kind ; which, nevertheless, for several years, produced berries, which grew and flourished perfectly well. This put him upon examining the plant more carefully than he had done before, when a great many male-flowers were found intermixed with the female ones ; and he adds, that he has frequently observed the same in many other plants, which are generally male and female in distinct plants, yet have sometimes both sexes on the same plant.

From what has been said, it appears very plain, that the embryo of the female flower must be impregnated by the farina fecundans, or male dust, in order to render the fruit perfect ; but how, or in what manner, it is performed, is what we can only guess at ; since, in the generation of animals, our greatest naturalists differ widely, as has been shewn above, in their opinions concerning the particular method how it is performed. If, says the reverend Dr. Hales, I may be allowed to indulge conjecture, I would propose it to the consideration of naturalists, whether, from the manifest proof we have that sulphur attracts air, a hint may not be taken to enquire whether this may not be the primary use of the farina fecundans, to attract and unite with itself, elastic or other refined active particles. That this farina abounds with sulphur, and that a very refined sort, is probable from the subtle oil which chemists obtain from the chives of saffron : and if this be the use of it, was it possible that it could be more aptly placed than on the slender points of the stamina, where it might easily, with the least breath of wind, be dispersed in the air ; thereby surrounding the plant, as it were, with an atmosphere of sublimed sulphureous pounce ? These uniting with particles of air, may, perhaps, be inspired at several parts of the plant, and especially at the pistil, and be thence conveyed to the capsula seminalis. And if to these united sulphureous and aerial particles, we suppose some particles of light to be joined (for Sir Isaac Newton has found that sulphur attracts light strongly) ; then the result of these three by far the most active principles in nature will be a punctum saliens, to invigorate the seminal plant : and thus we are at last conducted, by the regular analysis of vegetable nature, to the first

enlivening principle of their minutest origin.

So much for the generation of plants, and the discovery of their different sexes, upon which Linnæus has founded his system of botany, at present so much and so well received. Whoever, therefore, would consider, more minutely, the structure of flowers, and the almost infinite variety of the number and disposition of their parts, may consult Linnæus's *Philosophia Botanica*, lately published, where this subject is treated in a very copious and instructive manner.

But besides this regular and natural generation, many plants may be propagated, by planting cuttings or slips of them in the earth. See **CUTTINGS**.

**GENERATION of Stones.** See the article **LITHOGENESIS**.

**GENERIC NAMES**, among philosophers, the same with general terms. See the article **GENERAL TERMS**, supra.

**GENEROUSA**, among lawyers, the addition for a gentlewoman, who may quash any writ wherein she is termed spinster. See the article **SPINSTER**.

**GENESIS**, among mathematicians, signifies the formation or production of some figure or quantity. See the article **GENERATING**, supra.

**GENESIS**, among divines, a canonical book of the Old Testament, and the first of the pentateuch, or five books of Moses. The Hebrews call it *Bereschith*, or, In the beginning, these being the first words in the book. The Greeks gave it the name of *Genesis*, from its beginning with the history of the creation of the world. It includes the history of two thousand three hundred and sixty-nine years, and besides the history of the creation, contains an account of the original innocence and fall of man ; the propagation of mankind ; the rise of religion ; the general defection and corruption of the world ; the deluge ; the restoration of the world ; the division and peopling of the earth ; and the history of the first patriarchs down to Joseph, at whose death it ends.

It was easy for Moses to be satisfied of the truth of what he delivers in this book, because it came down to his time through a very few hands. For, from Adam to Noah, there was one man (*Methuselah*) who lived to see them both : in like manner, from Noah to Abraham, Shem conversed with them both ; as Isaac also did with Abraham and Joseph, from whom  
there

these things might easily be conveyed to Moses by Amram, who was cotemporary with Joseph. Moses is supposed to have written this book, during his retirement in the land of Midian, before he conducted the Israelites out of Egypt.

**GENET**, **GENNET**, or **JENNET**, in the manege, denotes a small sized, well proportioned spanish horse.

To ride *a la genette*, is to ride after the spanish fashion, so short, that the spurs bear upon the horse's flank.

**GENET** is also the name of a kind of cat, bred in Spain, somewhat bigger than a weasel, of a grey or black colour, but the fur of the black is the most valuable.

**GENETHLIACI**, in astrology, men who erect horoscopes, or pretend to predict what will happen to persons, from the stars which presided at their birth. See the article **HOROSCOPE**.

Nothing can be more absurd than this pretended science, and yet there have been times when princes themselves were greatly infatuated with these sort of people. The assurance with which these cunning fellows predicted future events made them always find dupes, and even after they were expelled from Rome by a decree of the senate, they met with such protection from the credulity of the people, that they still continued unmolested in the city.

**GENETHLIACUM**, or **GENETHLIAC POEM**, verses made on the birth of some prince, or other illustrious person, in which the poet, by a kind of prediction, promises him great advantages, great prosperity, and glorious victories. The same name is also given to verses of this kind, made on the birth of any person whatsoever.

**GENEVA**, a city near the confines of France and Switzerland, on the river Rhone, about sixty miles north-west of Lyons: east long. 6°, north lat. 46° 20'. Geneva is a fortified town, about two miles in circumference, situated at the west end of a lake sixty miles long, and twelve broad, called the lake of Geneva. It is a republic, governed by a council of 200, and a senate of twenty-five members; and is said to contain 30,000 inhabitants.

**GENEVA**, or **GIN**, among distillers, an ordinary malt-spirit, distilled a second time, with the addition of some juniper-berries. See the article **JUNIPER**. Originally, the berries were added to the malt in the grinding; so that the

spirit thus obtained was flavoured with the berries from first, and exceeded all that could be made by any other method. At present, they leave out the berries entirely, and give their spirits a flavour by distilling them with a proper quantity of oil of turpentine; which, though it nearly resembles the flavour of juniper-berries, has none of their valuable virtues.

**GENEVIEVE**, or *St. GENEVIEVE'S DAY*, a festival observed at Paris on the third of January, in honour of St. Genevieve, patroness of the city.

*Nuns of St. GENEVIEVE*. See the article **MIRAMJONES**.

**GENIAL**, an epithet given by the pagans to certain gods who were supposed to preside over generation.

The genial gods, says Festus, were earth, air, fire and water. The twelve signs, together with the sun and moon, were sometimes also ranked in the number.

**GENICULI**, among botanists, the knots or joints in the stalks of plants; whence they are denominated geniculate plants.

**GENIOGLOSSI**, in anatomy, two muscles which lie immediately under the geniohyoidæus. They arise fleshy from the fore-part of the lower jaw internally, and enlarging themselves, are inserted in the root of the tongue. When these act, they pull the tongue forwards, and thrust it out of the mouth.

**GENIOHYOIDÆUS**, in anatomy, is a muscle which arises in the middle of the chin, above the mylohyoides, and near the synchondrosis of the jaw: its termination is in the base of the os hyoides. See the articles **MYLOHYOIDES**, **SYNCHONDROSIS**, &c.

**GENIPA**, in botany, a genus of the *pentandria-monogynia* class of plants, the flower of which consists of a single, rotated petal; its tube is very short, and of a funnel-like shape; and the limb large, and divided into five deep segments. The fruit is a fleshy berry, of an oval figure, small at each end, truncated, and containing two cells, in which are a number of depressed angulated seeds. See Plate CX. fig. 4.

**GENIS**, a town of Savoy, situated on the river Guier, twelve miles west of Chambery.

**GENISTA**, **GREEN-WEED**, or **DYER'S-WEED**, a genus of the *diadelphia-decandria* class of plants, with papilionaceous flowers; and the fruit a roundish turgid,

turgid, and anilocular pod, containing a single kidney-like seed.

**GENISTA SPARTIUM**, a plant called by Linnæus *ulex*. See the article **ULEX**.

**GENISTELLA**, in botany, the same with the *genista*. See the article **GENISTA**.

**GENITAL**, an appellation given to whatever belongs to the parts of generation. See the article **GENERATION**.

**GENITAL GODS**, *dii genitales*, in roman antiquity, the same with the *indigetes*. See the article **INDIGETES**.

**GENITALIA**, or **GENITARIES**, in anatomy, a name sometimes given to the testes, or testicles of man, on account of their office in generation. See the article **TESTICLE**.

**GENITES**, *gevritus*, among the Hebrews, those descended from Abraham, without any mixture of foreign blood.

The Greeks distinguished by the name of *genites* such of the Jews as were issued from parents, who, during the babylonish captivity, had not allied with any gentile family.

**GENITIVE**, in grammar, the second case of the declension of nouns. The relation of one thing considered as belonging in some manner to another, has occasioned a peculiar termination of nouns, called the genitive case : But in the vulgar tongues, they make use of a sign to express the relation of this case. In english they prefix the particle *of*, in french *de*, or *du*, &c. Though in strictness there are no cases in either of these languages ; inasmuch as they do not express the different relations of things by different terminations, but by additional prepositions, which is otherwise in the latin, &c. See the article **CASE**.

In the hebrew tongue, the genitive case is marked in a very different manner from that of the greek and latin ; for whereas in those languages the noun governed is varied, in the hebrew the noun governing undergoes the alteration. See the article **HEBREW LANGUAGE**.

**GENITURA**, in botany, a name used by some for anethum, or dill.

**GENIUS**, a good or evil spirit, or dæmon, whom the antients supposed set over each person, to direct his birth, accompany him in life, and be his guard. See the article **DÆMON**.

The rank and office of the *genii* were inferior to those of the lares ; for the latter were the tutelar gods of a family, whereas the *genii* had the care or government only of single persons, or places.

Apuleius following the sentiment of Plato, gives the following account of the *genii*.

They are spirits who never were engaged in matter, nor were ever joined to bodies. Of these *genii* Plato is of opinion that every man has his own, who watches over him, and is a witness not only of his actions, but of his very thoughts ; and that, when the person dies, the *genius* conducts the soul of which he had the charge, to judgment, and assists at the trial : if the accused person falsifies, the *genius* convicts him ; if he speaks the truth, he confirms it ; and it is upon his evidence that sentence is pronounced.

The antients not only ascribed a *genius* to particular persons, but to places likewise. They allowed a *genius* to provinces and towns, to forests, trees, fountains, and to the sciences. Each person sacrificed once a year to his *genius*, and scattered flowers, and sprinkled wine to him : sometimes they offered leaven or salted dough, or a pig two months old.

It was commonly thought that each person had two *genii* attending him. Flattery introduced the custom of swearing by the *genius* of the emperors, among the Romans, in the decline of that empire. Socrates's *genius* is famous in antiquity. The Mahometans pretend that the *genii* inhabited the world many thousand years before Adam, under the reigns of several princes, who all bore the name of Solomon ; but falling at length into a general corruption, Ebbe was sent to drive them to a remote part of the earth, there to be confined ; that some of that generation, still remaining, they were by Talmurath, one of the antient kings of Persia, who waged war against them, forced to retreat to the famous mountains of Kaf. See the article **ANGEL**.

**GENIUS**, in matters of literature, &c. a natural talent or disposition to do one thing more than another ; or the aptitude a man has received from nature to perform well and easily that which others can do but indifferently, and with a great deal of pains.

To know the bent of nature is the most important concern. Men come into the world with a *genius* determined not only to a certain art, but to certain parts of that art, in which only they are capable of success. If they quit their sphere, they fall even below mediocrity in their profession. Art and industry add much to natural endowments, but cannot supply them

them where they are wanting. Every thing depends on genius. A painter often pleases without observing rules, whilst another displeases though he observes them ; because he has not the happiness of being born with a genius for painting.

A man born with a genius for commanding an army, and capable of becoming a great general by the help of experience, is one whose organical conformation is such, that his valour is no obstruction to his presence of mind, and his presence of mind makes no abatement of his valour. Such a disposition of mind cannot be acquired by art : it can be possessed only by a person who has brought it with him into the world. What has been said of these two arts, may be equally applied to all other professions. The administration of great concerns, the art of putting people to those employments for which they are naturally formed, the study of physic, and even gaming itself, all require a genius. Nature has thought fit to make a distribution of her talents among men, in order to render them necessary to one another : the wants of men being the very first link of society : she has therefore pitched upon particular persons to give them an aptitude to perform rightly some things which she has rendered impossible to others ; and the latter have a greater facility granted them for other things, which facility has been refused to the former. Nature, indeed, has made an unequal distribution of her blessings among her children ; yet she has disinherited none ; and a man divested of all kinds of abilities, is as great a phenomenon as an universal genius.

From the diversity of genius, the difference of inclination arises in man, whom nature has had the precaution of leading to the employments for which she designs them, with more or less impetuosity in proportion to the greater or lesser number of obstacles they have to surmount, in order to render themselves capable of answering this vocation. Thus the inclinations of men are so very different, because they follow the same mover, that is, the impulse of their genius. This, as with the painter, is what renders one poet pleasing, even when he trespasses against rules ; while others are disagreeable, notwithstanding their strict regularity.

The genius of these arts, according to the abbé du Bos, consists in a happy arrangement of the organs of the brain ; in a just conformation of each of these organs ; as also in the quality of the blood, which disposes it to ferment, during exercise, so as to furnish a plenty of spirits to the springs employed in the functions of the imagination. Here he supposes that the composer's blood is heated ; for that painters and poets cannot invent in cool blood ; nay, that it is evident they must be wrapt into a kind of enthusiasm when they produce their ideas. Aristotle mentions a poet who never wrote so well as when his poetic fury hurried him into a kind of frenzy. The admirable pictures we have in Tasso of Armida and Clorinda, were drawn at the expence of a disposition he had to real madness, into which he fell before he died. Do you imagine, says Cicero, that Pacuvius wrote in cold blood ? No, it was impossible. He must have been inspired with a kind of fury, to be able to write such admirable verses.

GENNET, or GENET. See GENET.

GENOA, a city and archbishop's see of Italy, and capital of the republic of the same name, is built on a strand near the sea, and rises gradually to the top of a hill ; the houses, which are lofty and well built, rising like the seats of a theatre, afford a fine prospect at sea. The harbour is large and deep, and the principal street, from one end to the other, resembles a double row of palaces : east long. 9° 30', and north lat. 44° 30'.

This city, which is fortified by a double wall, is six miles round, and contains thirty parish churches, twenty colleges, and as many convents and religious houses. The legislative authority is lodged in the great senate, consisting of the signiory and four hundred noblemen and principal citizens, elected annually out of the freemen. The signiory consists of the doge and twelve other members, who hold their places two years. Four parts in five of the senate must agree to the enacting of laws. The doge is obliged to reside in the palace the two years he is in office ; and after they are expired, he retires to his own house, where his administration is either approved or condemned ; and if the latter, he is proceeded against as a criminal.

The territories of the republic lie in the form of a crescent, along the coast of the

Mediterranean.

Mediterranean, extending 150 miles ; but the country no where reaches above twenty miles from the sea, and in some places not ten.

**GENS D'ARMES.** See **GENDARMES.**

**GENTIAN**, *gentiana*, in botany, a genus of the *pentandria-digynia* class of plants, the flower of which consists of a single petal, tubulated and imperforated at the base ; and at the edge, divided into five segments, various in figure : the fruit is an oblong, cylindric, acuminate capsule, slightly bifid at the top, formed of two valves, and containing only one cell : the seeds are numerous and small ; the receptacles are two, and grow to the two valves of the capsule.

The root of this plant is large, remarkably tough, and of a firm texture. It is brought to us from Germany, where it is in many places cultivated as liquorice is amongst us ; and is to be chosen fresh, tough, of a middle size, free from the small fibres, and well dried ; tho' if it be scorched, it is to be rejected.

This root is one of the best stomachic bitters that the materia medica affords : it procures an appetite, and greatly assists digestion. But if we give credit to some authors, this is one of the least of its virtues ; they have recommended it as a febrifuge and an alexipharmic, and as the most certain remedy for the bite of a mad dog. On this occasion it is not only recommended internally but externally, a cataplasm made of venice-treacle and the powder of this root, being ordered to be applied to the wound. It is also said to be a certain remedy for agues, and one of the best known medicines against the plague.

**GENTILE**, in matters of religion, a pagan, or worshipper of false gods.

The origin of this word is deduced from the Jews, who called all those who were not of their nation, by the name of גוים, *gojim*, i. e. gentes, which in the greek translations of the Old Testament, is rendered by *τα εθνη* ; in which sense it frequently occurs in the New Testament, as in Matt. vi. 32. *All these things the nations or gentiles seek.* Whence the latin church also used gentes, in the same sense as our gentiles, especially in the New Testament. But the word gentes soon got another signification, and no longer meant all such as were not Jews, but those only who were neither Jews nor Christians, but followed the superstitions of the Egyptians, Greeks, Romans,

&c. In this sense it continued among the christian writers, till their manner of speech, together with their religion, was publicly and by authority received in the empire, when gentiles, from gentes, came into use : and then both words had two significations, viz. in treatises or laws concerning religion, they signified pagans, neither Jews nor Christians : and in civil affairs, they were used for all such as were not Romans.

**GENTILE**, *gentilis*, in the roman law and history, a name which sometimes expresses what the Romans otherwise called barbarians, whether they were allies of Rome or not : but this word was used in a more particular sense for all strangers and foreigners not subject to the roman empire, in contradistinction to *provincialis*, or an inhabitant of a province of the empire.

The word is used in this sense in the Greek, but was not introduced into this or the latin tongue, till after christianity was established ; it being taken from scripture.

**GENTLEMAN**, a person of a noble birth, or descended of a family which has long borne arms.

Chamberlayne observes, that in strictness, a gentleman is one whose ancestors have been freemen, and have owed obedience to none but their prince ; on which footing no man can be a gentleman but one who is born such. But, among us, the term gentleman is applicable to all above yeomen ; so that noblemen may be properly called gentlemen. In our statutes, *gentilis homo* was adjudged a good addition for a gentleman. 27 Edw. III. The addition of knight is very antient, but that of esquire or gentleman was rare before 1 Hen. V.

**GENTLEMAN usher of the black rod.** See the article **ROD**.

**GENTLEMAN, or LORD of the bed-chamber.** See the article **BED-CHAMBER**.

**GENTLEMEN of the chapel**, officers whose duty and attendance is in the royal chapel, being in number thirty-two, whereof twelve are priests ; the other twenty, commonly called clerks of the chapel, assist in the performance of divine service. One of the first twelve is chosen for confessor of the household, whose office it is to read prayers every morning to the household servants, to visit the sick, examine and prepare communicants, and administer the sacrament.

One of the twenty clerks, well versed in music, is chosen first organist, who is  
 § S 2 master

master of the children, to instruct them in music, and whatever else is necessary for the service of the chapel; a second is likewise an organist; a third, a lutanist; and a fourth, a violist.

There are likewise three vergers, so called from the silver-rods they carry in their hands; being a serjeant, a yeoman, and groom of the vestry; the first attends the dean and sub-dean, and finds surplices and other necessaries for the chapel; the second has the whole care of the chapel, keeps the pews, and seats the nobility and gentry; the groom has his attendance within the chapel-door, and looks after it.

**GENTLEMEN PENSIONERS.** See the article **PENSIONER**.

**GENUFLEXION**, among ecclesiastical writers, the posture of kneeling, was a very antient custom in acts of devotion; though the Russians are said to esteem it indecent, and even the dissenters, among us, prefer that of standing.

**GENUS**, among metaphysicians and logicians, denotes a number of beings, which agree in certain general properties, common to them all; so that a genus is nothing else but an abstract idea, expressed by some general name or term. See the articles **ABSTRACTION** and **GENERAL TERMS**.

It is plain, therefore, that by a genus we do not barely signify one particular thing, nor yet a plurality of things; but a sort or kind of things, all agreeing in certain general properties.

Thus animal is said to be a genus in respect of man and brute, in regard man and brute agree in the common nature and character of animal: so a right lined figure of four sides, is a genus in respect of a parallelogram, and a trapezium; and so likewise is substance, in respect of substance extended, which is body; and thinking substance, which is mind.

The method by which the mind advances to form genera is, according to Mr. Locke, as follows. Observing several things that differ from the mind's idea of man, for instance, and therefore cannot be comprehended under that name, to agree with man in some certain qualities by retaining only those qualities, and uniting them into one idea, it gets another more general idea, to which giving a name, it makes a new genus, or a term of a more comprehensive extension. Thus by leaving out the shape, and other properties signified by the word man,

and retaining only a body with life, sense, and spontaneous motion, we form the idea signified by the name animal. By the same way the mind proceeds to body, substance; and at last to being, thing, and such universal terms as stand for any ideas whatever.

This shews the reason why, in defining things, we make use of the genus, namely, to save the labour of enumerating the several simple ideas which the next term stands for: from whence it appears, that genus is no more than an abstract idea comprehending a greater or less number of species, or more particular classes. See the article **SPECIES**.

Genus and species themselves are the workmanship of human understanding; tho' it is not denied that nature, in making things alike, lays the foundation of this sorting and classing, so that every distinct, abstract idea, is a distinct essence: whence in the schools, the word essence has been almost wholly applied to the artificial constitution of genus and species. See the article **ESSENCE**.

In the series of notions rising one above another in the degree of universality, that division which comprehends under it several genera, is called in the schools the higher genus, which denomination continues until we arrive at the last advance of the understanding; when being come to the most general of all ideas that admits not of a superior, it is distinguished by the name of the genus generalissimum. In like manner the several genera comprehended under a higher genus, are in respect of it considered as species; and as these last too have species under them, the inferior divisions are, for distinction's sake, termed lower species. Thus the progression continues, and when we come to the lowest sub-division of all, comprehending only individuals, we call this the species specialissima. All that lie between this and the highest distribution of things are the intermediate genera and species, which are termed each in their turn genus generalius, or species specialior, according as we consider them in the ascending or descending scale of our ideas; or, to speak in the language of logicians, according to their ascent or descent in linea prædicamentali.

**GENUS** is also used for a character or manner applicable to every thing of a certain nature or condition: in which sense it serves to make capital divisions in divers sciences,



sciences, as music, rhetoric, anatomy; and natural history.

**GENUS**, in music, by the antients called *genus melodiæ*, is a certain manner of dividing and sub-dividing the principles of melody; that is, the consonant and dissonant intervals, into their concinnous parts.

The moderns considering the octave as the most perfect of intervals, and that whereon all the concords depend, in the present theory of music, the division of that interval is considered as containing the true division of the whole scale. See the articles **SCALE** and **OCTAVE**.

But the antients went to work somewhat differently: the diatessaron, or fourth, was the least interval which they admitted as concord; and therefore they sought first how that might be most conveniently divided: from whence they constituted the diapente and diapason.

The diatessaron being thus, as it were, the root and foundation of the scale, what they called the genera, or kinds, arose from its various divisions; and hence they defined the *genus modulandi* the manner of dividing the tetrachord, and disposing its four sounds as to succession.

The genera of music were three, the enharmonic, chromatic, and diatonic: the two first were variously subdivided, and even the last, tho' that is commonly reckoned to be without any species; yet different authors have proposed different divisions under that name, without giving any particular names to the species, as was done to the other two.

For the characters, &c. of these several genera, see the articles **ENHARMONIC**, **CHROMATIC**, and **DIATONIC**.

**GENUS**, in rhetoric. Authors distinguish the art of rhetoric, as also orations or discourses produced thereby, into three genera, or kinds, demonstrative, deliberative, and judiciary.

To the demonstrative kind belong panegyrics, genethliacons, epithalamiums, funeral harangues, &c. See the articles **PANEGYRIC**, &c.

To the deliberative kind belong persuasions, dissuasions, commendations, &c. To the judiciary kind belong defences and accusations. See the articles **RHETORIC**, **ORATION**, &c.

**GENUS**, in algebra. The antient algebraists divided that art into two genera or kinds, *viz.* the logistic and specious. See **LOGISTIC** and **SPECIOUS**.

**GENUS**, in anatomy, the *genus nervosum*, or nervous kind; or, as others term it, the nervous system, is an expression pretty frequent among anatomists, signifying the nerves considered as an assemblage or system of similar parts, distributed throughout the body. See the articles **NERVE** and **NERVOUS**.

**GENUS**, in natural history, a sub-division of any class or order of natural beings, whether of the animal, vegetable, or mineral kingdoms, all agreeing in certain common characters.

The genera of animals ought to be established upon the most natural, obvious, and distinctive characters. Thus it would be absurd to range the ox and hog under the same genus, notwithstanding they both have divided hoofs; and it would be equally so to make the roe-deer, rein-deer, and elk, belong to different genera, merely because the figure of their horns differs considerably. Hence the characters of the genera of animals are to be taken from the figure, situation, number, and proportions of their parts; which constitute such a resemblance, as easily distinguishes them from the species of any other genus.

In the class of quadrupeds, besides a general resemblance, the different genera are distinguished from each other by the number and figure of their teeth, the shape of their feet, horns, and the like. See the article **QUADRUPED**.

In the class of birds, the general characters are drawn from the shape of their beak, and the number and disposition of their toes. See the article **BIRD**.

In the class of amphibious animals, the general characters are founded on the number of the crusts or scales on the bellies and tails of the serpent-kind, and on the figure of the tail, and the number and shape of toes in the lizard, frog, and tortoise-kinds. See the articles **SERPENT**, **LIZARD**, &c.

As to the genera of fishes, they are founded on a certain agreement between a number of species, arising from the similitude of their essential external parts; which always consist in the situation of these parts, for the most part also in number, and frequently in their figure and proportion.

The insect-class are distinguished into genera, from the number, figure, &c. of their antennæ, feet, snout, &c.

And the animalcules, as mentioned under the article **ANIMALCULE**.

With

With respect to the vegetable kingdom, all plants and trees are reduced to genera from the consideration of the number, situation, figure, and proportion of the parts of fructification. See the article **FRUCTIFICATION**.

In the same manner, the genera of fossils are established upon the figure, hardness, consistence, inflammability, and other obvious properties of the substances that compose the mineral kingdom. See the article **FOSSILS**.

**GEOCENTRIC**, in astronomy, is applied to a planet or its orbit, to denote it concentric with the earth, or as having the earth for its center, or the same center with the earth. See the articles **EARTH** and **PLANET**.

**GEOCENTRIC latitude of a planet**, is its distance from the ecliptic as it is seen from the earth, which, even though the planet be in the same point of her orbit, is not constantly the same, but alters according to the position of the earth in respect to the planet. For let **BAT** (plate CXIII. fig. 2.) be the orbit of the earth, **PNz** the orbit of the planet, which suppose to be at **P**; from which let fall on the plane of the ecliptic the perpendicular **PE**. In whatever part of her orbit the earth is, this line **PE** will always subtend the angle which measures the geocentric latitude of the planet. Suppose, therefore, the earth at **T**, and venus in **P**, where she comes nearest to the earth, in which position venus is seen in her inferior conjunction with the sun, and her geocentric latitude is measured by the angle **PTE**. But if venus should be in the same situation, **P**, and the earth were at **t**, and from thence venus were observed in her superior conjunction with the sun, where she is at her greatest distance from us, her geocentric latitude would be answerable to **PtE**, which is much less than the angle **PTE**, because the distance **Pt** is greater than **PT**.

What we have here said of the latitude of venus, is likewise true of that of mercury, and upon the same account. See **HELIOCENTRIC** and **LATITUDE**.

**GEOCENTRIC place of a planet**, the place wherein it appears to us from the earth, supposing the eye there fixed: or it is a point in the ecliptic to which a planet seen from the earth is referred.

**GEODÆSIA**, the same with surveying. See the article **SURVEYING**.

**GEOGRAPHICAL MILE**, the same with the sea-mile; being one minute, or the

sixtieth part of a degree of a great circle on the earth's surface.

**GEOGRAPHY**, the doctrine or knowledge of the terrestrial globe; or the science that teaches and explains the properties of the earth, and the parts thereof which depend upon quantity.

Geography, as defined by Varenius, is that part of mixt mathematics, which explains the state of the earth, and of its parts depending on quantity, *viz.* its figure, place, magnitude, and motion, with the celestial appearances, &c. In consequence of this definition, that author divides geography into general and special, or universal and particular.

By universal geography, is understood that part of the science which considers the whole earth in general, and explains its properties without regard to particular countries. This division is distinguished into three parts, absolute, relative, and comparative. The absolute part respects the body of the earth itself, its parts and peculiar properties, as its figure, magnitude, and motion; its lands, seas, and rivers, &c. The relative part accounts for the appearances and accidents that happen to it from celestial causes; and, lastly, the comparative contains an explanation of those properties which arise from comparing different parts of the earth together.

Special or particular geography, is that division of the science which describes the constitution and situation of each single country by itself; and is twofold, *viz.* chorographical, which describes countries of a considerable extent; or topographical, which gives a view of some place, or small tract of the earth. See the articles **CHOROGRAPHICAL** and **TOPOGRAPHICAL**.

Hence the object or subject of geography is the earth, especially its superficies and exterior parts.

The properties of geography, according to the same writer, are of three kinds, *viz.* celestial, terrestrial, and human. The celestial properties are such as affect us by reason of the apparent motion of the sun and stars. These are eight in number. 1. The elevation of the pole, or the distance of a place from the equator. 2. The obliquity of the diurnal motion of the stars above the horizon of the place. 3. The time of the longest and shortest day. 4. The climate and zone. 5. Heat, cold, and the seasons of the year; with rain, snow, wind, and other

other meteors. 6. The rising, appearance and continuance of the stars above the horizon. 7. The stars that pass through the zenith of a place. 8. The celerity of the motion with which, according to the copernican hypothesis, every place constantly revolves. See the articles ELEVATION, POLE, &c.

The terrestrial properties are those observed in the face of each country, and are ten in number. 1. The limits and bounds of each country. 2. Its figure. 3. Its magnitude. 4. Its mountains. 5. Its waters, *viz.* springs, rivers, lakes, and bays. 6. Its woods and deserts. 7. The fruitfulness and barrenness of the country, with its various kinds of fruits. 8. The minerals and fossils. 9. The living creatures there. 10. The longitude and latitude of the place.

The third kind of observations to be made in every country is called human, because they chiefly regard the inhabitants of the place, and these are also ten in number. 1. Their stature, shape, colour, and the length of their lives; their origin, meat, and drink. 2. Their arts, and the profits which arise from them, with the merchandize and wares they barter one with another. 3. Their virtues and vices, learning, capacities, and schools. 4. Their ceremonies at births, marriages, and funerals. 5. The language which the inhabitants use. 6. Their political government. 7. Their religion and church government. 8. Their cities and famous places. 9. Their remarkable histories. 10. Their famous men, artificers, and inventions of the natives.

These are the three kinds of occurrences to be explained in special geography.

In universal geography, the absolute division of the earth, and the constitution of its parts, are examined; and the celestial phenomena in general are to be applied to their respective countries in special geography.

The principles of geography, or those from which arguments are drawn for proving of propositions in that science, are, according to Varenus, of three sorts. 1. Geometrical, arithmetical, and trigonometrical propositions. 2. Astronomical precepts and theorems. 3. Experience, being that upon which the greatest part of geography, and chiefly the special, is founded.

In proving geographical propositions, we are to observe that several properties, and

chiefly the celestial, are confirmed by proper demonstrations; but in special geography, excepting the celestial, almost every thing is explained without demonstration; being either grounded on experience and observation, or on the testimony of our senses: nor can they be proved by any other means. There are also several propositions proved, or rather exposed to view, by the terrestrial globe, or by geographical maps. See the articles GLOBE and MAP.

Other propositions cannot be so well proved, yet are received as apparent truths. Thus, tho' we suppose all places on the globe, and in maps, to be laid down in the same order as they are really on the earth; nevertheless, in these matters, we rather follow the descriptions that are given by geographical writers.

The manner in which we have treated the several geographical articles that occur throughout this work, may be seen under each head, and our division of the science may be seen in the introduction.

Geography is very antient, at least the special part thereof; for the antients scarce went beyond the description of countries. It was a constant custom among the Romans, after they had conquered and subdued any province, to have a map or printed representation thereof, carried in triumph, and exposed to the view of the spectators. Historians relate, that the roman senate, about an hundred years before Christ sent geographers into divers parts to make an accurate survey and mensuration of the whole globe, but they scarce ever saw the twentieth part of it.

Before them, Neco, king of Egypt, ordered the Phœnicians to make a survey of the whole coast of Africa, which they accomplished in three years. Darius procured the Ethiopic-sea, and the mouth of the Indus, to be surveyed; and Pliny relates, that Alexander, in his expedition into Asia, took two geographers to measure and describe the roads; and that from their itineraries, the writers of the following ages took many particulars. Indeed this may be observed, that whereas most other arts and sciences are sufferers by war, geography and fortification alone have been improved thereby. Geography, however, must have been exceedingly defective, as a great part of the globe was then unknown, particularly all America, the northern parts of Europe and Asia, with the Terra Australis,

fralis, and Magellanica ; and as they were ignorant of the earth's being capable to be failed round, and of the torrid zone's being habitable, &c.

The honour of reducing geography to art and system, was reserved for Ptolemy, who, by adding mathematical advantages to the historical method in which it had been treated of before, has described the world in a much more intelligible manner : he has delineated it under more certain rules, and by fixing the bounds of places from longitude and latitude, hath discovered others mistakes, and has left us a method of discovering his own.

There is one thing yet very lame in our geography, the fixing the true longitude of places ; and though several new ways have been lately tried to redress this inconvenience, both from exact pendulums, and from other observations, upon the immersions and emersions of jupiter's satellites, yet they have not altogether proved effectual. See the article LONGITUDE.

The principal writers upon geography, among the antients, are Ptolemy, Pliny, and Strabo : among the moderns, Joannes de Sacrobosco, Cluverius, Heylen, Ricciolus, Weigelius, de Chales, and, above all, Varenius, with Jurin's additions ; to which may be added Leibnecht, Sturmius, Morden, Gordon, Salmon, &c.

**GEOMANCY**, *γομανεια*, according to Polydore Virgil, a species of divination performed by means of chinks made in the ground. Though others think it consisted in making a number of little dots on paper, at random ; and from the various figures which those make, forming a judgment of futurity.

**GEOMETRICAL**, in general, an appellation given to whatever belongs to, or is strictly connected with geometry. See the article GEOMETRY.

**GEOMETRICAL construction of equations.** See the article CONSTRUCTION.

**GEOMETRICAL CURVE.** See CURVE.

**GEOMETRICAL LOCUS**, or PLACE. See the article LOCUS.

**GEOMETRICAL PACE.** See PACE.

**GEOMETRICAL PLANE**, in perspective. See the article PLANE.

**GEOMETRICAL PROGRESSION and PROPORTION.** See PROGRESSION and PROPORTION.

**GEOMETRICAL solution of a problem**, is when it is solved according to the rules

of geometry, and by such lines as are truly geometrical, and agreeable to the nature of the problem. See PROBLEM.

**GEOMETRY**, *γεωμετρια*, originally signified no more than the art of measuring the earth, or any distances or dimensions within it ; but at present, it denotes the science of magnitude in general ; comprehending the doctrine and relations of whatever is susceptible of augmentation or diminution, considered in that light.

Hence, to geometry may be referred the consideration not only of lines, surfaces, and solids ; but also of time, velocity, number, weight, &c.

Plato thought the word geometry an improper name for this science, and accordingly substituted in its place the more extensive one of mensuration ; and, after him, others gave it the title of pantometry, as demonstrating not only the quantities of all manner of magnitudes, but also their qualities, ratios, positions, transformations, relations, &c. And Proclus calls it the knowledge of magnitudes and figures, and their limitations ; also of their motions, and affections of every kind.

**Origin and progress of GEOMETRY.** This science had its rise among the Egyptians, who were in a manner compelled to invent it, to remedy the confusion which generally happened in their lands, from the inundations of the river Nile, which carried away all boundaries, and effaced all the limits of their possessions. Thus this invention, which at first consisted only in measuring the lands, that every person might have what belonged to him, was called geometry, or the art of measuring land ; and it is probable, that the draughts and schemes, which they were annually compelled to make, helped them to discover many excellent properties of these figures ; which speculations continued to be gradually improved, and are so to this day.

From Egypt geometry passed into Greece, where it continued to receive new improvements in the hands of Thales, Pythagoras, Archimedes, Euclid, &c. The elements of geometry, written by this last in fifteen books, are a most convincing proof to what perfection this science was carried among the antients. However, it must be acknowledged, that it fell short of modern geometry, the bounds of which, what by the invention of fluxions, and the discovery of the

almost

almost infinite orders of curves, are greatly enlarged. See the articles *CURVE* and *FLUXION*.

We may distinguish the progress of geometry into three ages : the first of which was in its meridian glory at the time when Euclid's Elements appeared ; the second, beginning with Archimedes, reaches to the time of Des Cartes, who, by applying algebra to the elements of geometry, gave a new turn to this science, which has been carried to its utmost perfection by sir Isaac Newton and Mr. Leibnitz.

*Division of GEOMETRY.* This science is usually distinguished into elementary, and higher or sublime geometry.

The first, or elementary geometry, treats of the properties of right lines, and of the circle, together with the figures and solids formed by them. The doctrine of lines comes first, then that of surfaces, and lastly that of solids.

The higher geometry comprehends the doctrine of the conic sections, and numerous orders of curves. See the article *CONIC SECTIONS* and *CURVE*.

Geometry is again divided into speculative and practical ; the former treating of the properties of lines and figures, as Euclid's Elements, Apollonius's Conic Sections, &c. and the latter shewing how to apply these speculations to the use of mensuration, navigation, surveying, taking heights and distances, gauging, gunnery, &c. See the articles *MENSURATION*, *NAVIGATION*, &c.

We have an excellent treatise on this subject by Dr. Gregory, with additions by Mr. Maclaurin : it is divided into three parts ; the first of which teaches the mensuration of lines and angles. In the second, surfaces are treated of ; and these not only such as are plain, but likewise curve-surfaces, as those of a cylinder, cone, and sphere. The third part treats of solid figures and their mensuration, as sphere, cylinder, cone, &c. See the articles, *SPHERE*, *CYLINDER*, &c.

*Usefulness of GEOMETRY.* The usefulness of this science extends to almost every art and science. It is by the help of it that astronomers turn their observations to advantage, regulate the duration of times, seasons, years, cycles, and epochas ; and measure the distance, motions, and magnitudes of the heavenly bodies. It is by it that geographers determine the figure and magnitude of the whole earth ; and delineate the extent and bearings of kingdoms, provinces, harbours, &c. It is

from this science too, that architects derive their just measures, in the construction of public edifices as well as of private houses. See the articles *ASTRONOMY*, *GEOGRAPHY*, and *ARCHITECTURE*. It is by the assistance of geometry that engineers conduct all their works, take the situation and plans of towns, the distances of places, and the measure of such things as are only accessible to the sight. It is not only an introduction to fortification, but highly necessary to most mechanics, especially carpenters, joiners, mathematical-instrument-makers, and all who profess designing. See *CARPENTRY*, *JOINERY*, *SHIP-BUILDING*, *ENGRAVING*, *DESIGNING*, &c.

On geometry likewise depends, the theory of music, optics, perspective, drawing, mechanics, hydraulics, pneumatics, &c. See *MUSIC*, *OPTICS*, *PERSPECTIVE*, *DRAWING*, *MECHANICS*, &c.

*GEOPONIC*, something relating to agriculture. See *AGRICULTURE*.

*GEORGE*, or *Knights of St. GEORGE*, has been the denomination of several military orders, whereof that of the garter is one of the most illustrious. See *GARTER*.

There is also one of these orders still subsisting at Genoa.

*Religious of the order of St. GEORGE*, form several congregations in Italy and other places.

*St. GEORGE del Mina*, the capital of the dutch settlements, on the Gold-coasts of Guinea, situated seven or eight miles west of Cape-coast-castle, the capital of the british settlements there : west lon. 5°, and north lat. 5°.

*Fort St. GEORGE*, a town and fort on the coast of Cormandel, in the hither India : east lon. 80°, and north lat. 13°.

The town is divided into the White and Black-town. The fort, and White-town, which adjoins to it, are inhabited only by british ; the whole circumference, which is not above half a mile, being surrounded by a stone wall. The outward or Black-town, called Madras, has been lately encompassed by a stone wall and bastions, and is about a mile and a half in circumference ; the whole being almost environed by a river and the sea.

*St. GEORGE's*, the largest of the Bermuda or Summer-islands.

*Cross of St. GEORGE*, a red one in a field argent, which makes part of the british standard. See *CROSS* and *GARTER*.

*GEORGIA*, in Asia, a province bounded by Circassia and Dagestan on the north,

by the Caspian sea on the east, by Armenia or Turcomania on the south, and by Mingrelia on the west.

**GEORGIA**, in America, one of the british plantations, taken out of South-Carolina, from which it is separated by the river Savannah on the north, and bounded by the Atlantic ocean on the east, by the river of St. John, which divides it from spanish Florida, on the south and west.

**GEORGIAN MONKS AND NUNS**, religious of Georgia, in Asia, who follow the rule of St. Basil. See the article **BASIL**.

**GEORGIC**, a poetical composition upon the subject of husbandry, containing rules therein, put into a pleasing dress, and set off with all the beauties and embellishments of poetry.

The style proper to a georgic must be worked up with a great deal of thought and vigour, that the words may be lively, and every thing the poet describes may immediately rise up to the reader's view. Hesiod and Virgil are the two greatest masters in this kind of poetry. In Virgil's Georgics are contained the most useful rules for husbandry in all its branches. Virgil has infinitely exceeded Hesiod in this sort of writing: he began his Georgics at the persuasion of Mæcenas, and was near seven years about them: they are, with respect to the diction, the most finished of all his works, and even of all the poems that ever were composed in latin. The moderns have produced nothing in this kind, except Rapin's book Of Gardening, and the celebrated poem entitled Cyder, by Mr. Philips, who, if he had enjoyed the advantage of Virgil's language, would have been second to Virgil in a much nearer degree.

**GERANITES**, in natural history, an appellation given to such of the semipellucid gems, as are marked with a spot resembling a crane's eye.

**GERANIUM**, **CRANE'S BILL**, in botany, a genus of the *monadelphia-decandria* class of plants, the flower of which consists of five large, patent, oval, and vertically cordated petals; the fruit is a capsule, of the form of a crane's bill.

Geranium stands recommended by authors, as one of the greatest vulneraries and astringents of the vegetable world, particularly for stopping hæmorrhages, excels of the menfes. &c.

**GERARDIA**, in botany, a genus of the *distymania-angiospermia* class of plants, the corolla of which consists of a single lingent petal; the tube is roundish, and

longer than the cup; the upper lip is erect, obtuse, plain, and emarginated; the lower lip is reflected, and divided into three segments: the fruit is an oval capsule, containing two cells, and consisting of two valves; the seeds are oval and single.

This plant is much recommended in gouty disorders.

**GERAW**, a town of Germany, nine miles north-west of Darmstat.

**GERBERA**, in botany, a genus of the *syngenesia-polygamia* class of plants, the general corolla of which is radiated, with very numerous hermaphrodite corollulæ on the disc, which are monopetalous, erect, and divided into three segments at the limb; the stamina are five very short filaments; the seeds are single, oblong, crowned with slender down, and contained in the cup.

**GERFALCON**, or **GYRFALCON**, among sportsmen, a hawk of great force. See the article **HAWK**.

The gerfalcon is the largest of the falcon-kind, with head and eyes like those of the haggard. She is strong armed, having long stretchers and singles; and being of a fierce and hardy nature, is extremely difficult to be reclaimed; but when once she is overcome, she proves an excellent hawk, and will scarce refuse to fly at any thing. See **FALCONRY**.

**GERGENTUM**, a town of Sicily, the Agrigentum of the antients, about fifty-five miles south-east of Palermo: east lon. 13° 30', and north lat. 37° 20'.

**GERMAINS**, or **St. GERMAINS**, a town and royal palace of France, fourteen miles north-west of Paris.

**St. GERMAINS** is also a borough of Cornwall, eight miles west of Plymouth.

It sends two members to parliament.

**GERM**, among gardeners, the same with bud. See the article **BUD**.

**GERMAN**, in genealogy, denotes entire or whole: thus, a brother-german is one both by the father's and mother's side; and cousins-german are the children of brothers or sisters.

**GERMAN**, or **GERMANIC**, also denotes any thing belonging to Germany; as the german empire, german flute, &c.

**GERMANDER**, in botany, the english name of the teucricum of Linnæus. See the article **TEUCRICUM**.

**Water-GERMANDER**, a plant called by botanists scordium. See **SCORDIUM**.

**GERMANY**, an extensive empire of Europe, situated between 5° and 10° east longitude,

longitude, and between 45° and 55° north latitude; bounded by Denmark and the Baltic sea on the north, by Poland and Hungary on the east, by Switzerland and the Alps on the south, and by France, Holland, &c. on the west.

It is divided into ten circles, three of which lie on the north, *viz.* Upper and Lower Saxony, and Westphalia; three on the south, *viz.* Austria, Bavaria, and Swabia; three about the middle, *viz.* Franconia, and the Upper and Lower Rhine; the tenth, which consisted of the dutchy of Burgundy and the seventeen provinces of the Netherlands, have long been detached from the empire. See SAXONY, WESTPHALIA, &c.

There are in Germany upwards of three hundred sovereign princes and states, most of them arbitrary in their respective territories.

GERMEN, or GERM, the same with bud. See the article BUD.

GERMERSHEIM, a town of Germany, subject to France, about ten miles east of Landau: east lon. 8° 15', and north lat. 49° 12'.

GERMINATION, the first sprouting of the seeds of plants. See VEGETATION.

GERONTES, in grecian antiquity, a sort of magistrates of antient Sparta, answering to the areopagites at Athens.

GERTRUDENBURG, a fortified town of the united Netherlands, in the province of Holland, nine miles north of Breda; subject to the prince of Orange.

GERUND, in grammar, a verbal noun of the neuter gender, partaking of the nature of a participle, declinable only in the singular number, through all the cases except the vocative; as, nom. *amandum*, gen. *amandi*, dat. *amando*, accus. *amandum*, abl. *amando*.

Grammarians are very much embarrassed to settle the proper nature and character of gerunds. It is certain they are no verbs, nor distinct moods of verbs, in regard they do not mark any judgment or affirmation of the mind, which is the essence of a verb; besides their having cases, which verbs have not. Some, therefore, will have them to be adjectives passive, whose substantive is the infinitive of the verb: on this footing they are denominated verbal nouns, or names formed of verbs, and retaining the ordinary regimen thereof. See the article NOUN.

The gerunds are derived from active, neuter, and deponent verbs; and, for the most part, they follow their signification;

as, *docendum*, from *doceo*; *currendo*, from *curro*; *loquendum*, from *loquor*.

GESNERIA, in botany, a genus of plants, of the *didynamia* class, the flower of which is monopetalous, tubular, and divided into five segments at the limb; the fruit is a roundish capsule, containing a very great number of extremely small seeds.

GESSEIT, or *Quam diu se bene* GESSE-  
RIT. See the article QUAM DIU.

GESSES, or JESSES, the furniture belonging to a hawk. See JESSES.

GESTATION, among physicians, the same with pregnancy. See the article PREGNANCY.

GESTICULATION, in rhetoric, signifies the affected action of an orator, which is deemed a great fault. See ACTION.

GESTRICIA, a province of Sweden, bounded by Helsingia on the north; by the Bothnic gulph on the east, by Upland on the south, and by Dalecarlia on the west.

GESTU ET FAMA, an antient writ, where a person's good behaviour was impeached, now out of use.

GESTURE, in rhetoric, consists chiefly in the proper action of the hands and face. It is a kind of natural language, that supplies the use of speech in persons born dumb. See the article ACTION.

GETHYLLIS, in botany, a genus of the *decandria-monogynia* class of plants; the corolla of which consists of a single petal; the tube is filiform and very long; the limb is plane, divided into six equal segments, of a lanceolated figure, and but about a third part the length of the tube, the fruit is an oblong, ventricose, triangular capsule, with three cells; the seeds are numerous.

GEVAUDAN, a territory of Languedoc, adjoining to the Cevennes.

GEVER, or St. GOAR, a town of Germany, fifteen miles south of Coblentz.

GEUM, *avens*, in botany, a genus of the *icosandria-pentagynia* class of plants, the corolla of which consists of five roundish petals, with narrow unguis of the length of the cup, and inserted into it; there is no pericarpium; the common receptacle of the seeds is oblong, hairy, and placed on the cup, which is, at that time, reflex: the seeds are numerous, compressed, hispid, and each furnished with a long geniculated style.

GEUM, is also used for saxifrage, *saxifraga*. See the article SAXIFRAGE.

GEX, a town of France, seven miles north-west of Geneva.

**GHEMARA**, or **GEMERA**. See the article **GEMARA**.

**GHENT**, or **GAUNT**, a city and capital of Flanders, thirty miles north-west of Brussels: east lon.  $3^{\circ} 36'$ , north lat.  $51^{\circ}$ . It is a large fortified town, twelve miles in circumference, and defended by a citadel; and yet is a place of no great strength, by reason of the vast extent of ground it takes in.

**GHILIAN**, a town of the french Netherlands, five miles west of Mons.

**GIAGH**, in chronology, a cycle of twelve years; in use among the Turks and Cathayans. See the article **CYCLE**.

Each year of the giagh bears the name of some animal: the first, that of a mouse; the second, that of a bullock; the third, of a lynx or leopard; the fourth, of a horse; the fifth, of a crocodile; the sixth, of a serpent; the seventh, of a horse; the eighth, of a sheep; the ninth, of a monkey; the tenth, of a hen; the eleventh, of a dog; and the twelfth, of a hog.

They also divide the day into twelve parts, which they call giaghs, and distinguish them by the name of some animals. Each giagh contains two of our hours, and is divided into eight kehs, as many as there are quarters in our hours.

**GIALLOLINO**, in natural history, a heavy, friable, fine, yellow ochre, called naples-yellow, and much used among painters, who esteem it a very fine colour. See the article **OCHRE**.

**GIANT**, *gigas*, a person of enormous bulk, or stature.

The reality of giants, and of nations of giants, is much controverted among the learned. Dr. Derham observes, that though we read of giants before Noah's flood, yet there is great reason to think the size of a man was always the same from the creation: for as to the nephilim, or giants, in Gen. vi. the antients vary about them; some taking them for great atheists, and monsters of impiety, rapine, tyranny, and all wickedness, as well as of monstrous stature. And as to those Numb. xiii. represented as men of gigantic size, it is probable the fears of the spies might have added thereto: however this be, it is plain that in both these places giants are spoke of as rarities and wonders of the age, not of the common stature; and such instances we have had in all ages.

**GIANT'S BONES**, in natural history, a name erroneously given to certain fossil bones, vulgarly supposed to have been the bones of giants; but, in reality, are those of the elephant or whale-kind.

**GIANT'S CAUSEWAY**, a vast collection of a black kind of marble, called basalt, in the county of Antrim, in Ireland. See the article **BASALTES**.

**GIAROLA**, in ornithology, a species of lark, with a remarkably long heel.

**GIAROLO**, a species of snipe, with a white tail. See the article **SNIFE**.

**GIBBOUS**, a term in medicine, denoting any protuberance or convexity of the body, as a person hunched, or hump-backed.

**GIBBOUS**, in astronomy, a term used in reference to the enlightened parts of the moon, whilst she is moving from the first quarter to the full, and from the full to the last quarter: for all that time the dark part appears horned, or falcated; and the light one hunched out, convex, or gibbous. See the article **MOON**.

**GIBELINS**, or **GIBELLINS**, a famous faction in Italy, opposite to another, called the **guelphs**.

These two factions ravaged and laid waste Italy for a long series of years, so that the history of that country, for the space of two centuries, is no more than a detail of their mutual violences and slaughters. The gibelins stood for the emperor against the pope: but concerning their origin and the reason of their names, we have but a very obscure account. According to the generality of authors, they rose about the year 1240, upon the emperor Frederic II's being excommunicated by pope Gregory IX. Other writers maintain, that the two factions arose ten years before, though still under the same pope and emperor. But the most probable opinion is that of Maimbourg, who says, that the two factions of guelphs and gibelins arose from a quarrel between two antient and illustrious houses on the confines of Germany, that of the Heniys of Gibeling, and that of the Guelphs of Adorf.

**GIBET**, a kind of gallows, whereon criminals are executed, or hung in chains. See the article **GALLOW**.

**GIBLETS**, *gigeria*, the offals of poultry, particularly of a goose and duck, including the head and neck, heart, liver, pinions, and legs; which the art of cookery has busied itself about, by inventing ragouts, pies, soups, &c. made of them.

**GIBRALTAR**,



**GIBALTAR**, a port-town of Andalusia, in Spain, subject to Great Britain : west lon. 6°, and north lat. 36°.

It stands at the foot of mount Calpe, one of Hercules's Pillars, about sixteen miles north of Ceuta, in Africa, from which it is divided by the Straights, to which it gives name. It is built on a rock, in a peninsula, and can only be approached on the land-side by a very narrow passage between the mountain and the sea : cross this passage the Spaniards have drawn a line, and fortified it, to prevent the garrison's having any communication with the country.

The Straights of Gibraltar are about twenty-four miles long, and fifteen broad.

**GIESEN**, a town of Germany, thirty miles north of Francfort.

**GIFT**, in law, a conveyance, by which either lands or goods are passed : it is of larger extent than a grant, being applied to things moveable and immoveable.

A gift may be by deed, by word, or in law : thus, all a person's goods and chattels, except in some special cases, may be given without deed ; though such a gift is liable to suspicion. When such a gift is made in satisfaction of a debt, it should be done before witnesses of credit ; that the goods and chattels be, at the same time, appraised to the full value ; and that the gift be expressly made in full satisfaction of the debt.

As to gifts in law, where a man is married, all the goods and chattels of his wife belong to the husband ; also, if a person be made executor of a will, by gift in law, all the testator's goods are his, after paying the testator's debts.

And as to deed of gift, all things that lie in livery, as messuages, lands, woods, &c. may be given or granted in fee for life, or years, at first ; and be assigned over forever, afterwards. Such a deed may be made upon condition ; and, if it be of goods and chattels, the delivery of a pence is a good feisin of the whole.

**GIG**, or **GIGG**. See the article **GIGG**;

**GIGANTIC**, something of a monstrous size, like that of giants. See **GIANT**.

**GIGERLÆ**, the same with giblets. See the article **GIBLETS**.

**GIGG**, or **JIGG**, in music, denotes a brisk and lively air ; or an airy kind of dance, to a sprightly measure.

**GIGOT-BRANCH**, in the manege. See the article **BRANCH**.

**GILAN**, a province of Persia, bounded by the Caspian sea on the north. Its ca-

pital is a city of the same name : east lon. 48°, and north lat. 37°.

**GILBERTINES**, a religious order founded in England by St. Gilbert, in the reign of Henry I. The nuns followed the rule of St. Benedict, and the monks, that of St. Augustin. There were many monasteries of this order in different parts of England.

**GILD**, or **GUILD**. See **GUILD**,

**GILDING**, the art of spreading or covering a thing with gold, either in leaf or liquid. See the article **GOLD**.

We have this advantage over the antients, in the manner of using and applying the gold, that the secret of painting in oil, lately discovered, furnishes us with means of gilding works, capable of enduring all the violences of time and weather, which theirs could not.

There are several methods of gilding in use among us, as gilding in water, gilding in oil, gilding by fire, &c. of each of which in order.

*The method of water-GILDING.* Water-gilding requires more preparation than oil-gilding, and is chiefly on wooden works, and those made of stucco ; and these too must be sheltered from the weather. A size is used for this way of gilding made of threads, &c. of parchment or gloves boiled in water to the consistence of a jelly. If the thing to be gilt be of wood, it is first washed with this size, boiling hot, and then set to dry ; and afterwards with white paint mixed up with the same size. Some use Spanish white for this purpose, and others plaster of Paris, well beaten and sifted. This sized paint must be laid on with a stiff brush ; which is to be repeated seldomer or oftener according to the nature of the work, as ten or twelve times in flat or smooth works, but seven or eight will be sufficient in pieces of sculpture. In the former case they are applied by drawing the brush over the work, in the latter by dabbing it. When the whole is dry, they moisten it with fair water, and rub it over with several pieces of coarse linnen, if it be on the flat ; if not, they beat or switch it with several slips of the same linnen, tied to a little stick, to make it follow and enter all the cavities and depressures thereof.

Having thus finished the white, the next thing to be done, is to colour it with yellow ochre : but if it be a piece of sculpture in relievo, they first touch it up, and prepare the several parts, which may have

have happened to have been disfigured, by the small iron instruments, as gouges, chissels, &c. The ochre used for this purpose must be well ground and sifted, and mixed up with the size before-mentioned. This colour is to be laid on hot; and in works of sculpture, supplies the place of gold, which sometimes cannot be carried into all the depressures and cavities of the foliages and other ornaments. A lay is also applied over this yellow, which serves for the ground on which the gold is to be laid: this lay is usually composed of armenian bole, blood-stone, black-lead, and a little fat; to which some add soap, and oil of olives; others, burnt-bread, bistre, antimony, glass of tin, butter, and sugar-candy. These ingredients being all ground down together with hot size, three lays of this composition is applied upon the yellow, the one after the other has been dried; being cautious not to put any into the cavity of the work to hide the yellow.

The brush, used for this purpose, must be a soft one; and when the matter is become very dry, they go over it again with a stronger brush, to rub it down, and take off the small grains that stick out, in order to facilitate the burnishing of the gold. To be prepared for gilding, you must have three sorts of pencils; one to wet, another to touch up and amend, and a third to flatten; also a gilding cushion, for spreading the leaves of gold on when taken out of the book; a knife to cut them, and a squirrel's tail fitted with a handle; or else a piece of fine soft stuff on a stick, to take them up directly and apply them. You are first to begin with wetting your pencils; by which the last lay laid on with water is moistened, that it may the better receive and retain the gold. Then you are to lay the leaves of gold on the cushion, and if whole, you must take up with the squirrel's tail, but if in pieces, with the other instrument, or the knife wherewith they are cut, and lay and spread them gently on the parts of the work you had moistened before. If the leaves, as they frequently do, happen to crack or break in laying on, these breaches must be made up with small bits of leaf, taken up upon the repairing pencil, and the whole work is to be smoothed either with the same pencil, or another something larger; the gold being pressed into the dents, into which it could not be so easily carried by the squirrel's tail.

The work having been thus far gilded, must be set to dry, in order to be burnished or flattened. See BURNISHING and FLATTING.

The last operation is the applying the vermeil in all the little lines and cavities; and to stop and amend any little faults with shell-gold. The composition called vermeil is made of gum gutta, vermilion, and a little of some ruddy-brown, ground together with venetian varnish and oil of turpentine. Some gilders, instead of this, make shift with fine lacca, or dragon's blood, with gum-water.

Sometimes instead of burnishing the gold, they burnish the ground or composition laid on the last before it, and only afterwards wash the part over with the size. This method is chiefly practised for the hands, face, and other nudities in rilievo: which, by this means, do not appear so very brilliant as the parts burnished, though much more so than the parts perfectly flat.

To gild a piece of work, and yet preserve white grounds, they apply a lay of Spanish white, mixed with a weak fish-glue on all the parts of the ground, whereon the yellow or the last lay might run.

*The method of GILDING in oil.* This operation requires much less apparatus than that before-mentioned. The basis or matter whereon the gold is laid, in this method, is the remains of colours found settled to the bottom of the pots in which painters wash their pencils. This matter, which is very viscid or sticky, is first ground, and then passed through a linnen-cloth, and thus laid on the matter to be gilt, after it is washed once or twice over with size; and if it be wood, with some white paint.

When this is almost dry, but yet is still unctuous enough to catch and retain the gold, the leaf-gold is laid on, either whole, if the work be large, or cut to pieces, if smaller: the leaves of gold are taken up and laid on with a piece of fine, soft, well-carded cotton; or sometimes by a palat for the purpose, or sometimes with the knife with which the leaves were cut, according to the parts of the work that are to be gilded, or the breadth of the gold that is to be laid on. As the gold is laid on, they pass over it a coarse stiff pencil or brush, to make it stick and as it were incorporate with the ground; and after this they mend any cracks that may have happened in it, either with the same pencil or one that is smaller,

smaller, as has been shewn before in water-gilding.

This kind of gilding is chiefly used for domes and roofs of churches, courts, banquetting-houses, &c. and for figures of plaster of Paris, lead, &c.

*The method of GILDING with liquid gold.*

This is performed by gold reduced to a calx and amalgamated with mercury, in the proportion of about an ounce of mercury to a dram of gold. To perform this, they heat a crucible red-hot, and then put the gold and mercury into it, stirring them gently about till the gold be found melted, and incorporated into a mass with the mercury. When this is done, they cast them into water, to wash and purify them; and out of that into other waters, where the amalgama, which is almost as liquid as if there were nothing but quicksilver in it, may be preserved a long time for use.

Before they proceed to lay this amalgamated gold on the metal, they first render the metal rough, by washing it over with aqua fortis, or aqua secunda; and afterwards rinse the metal in fair water, and scour it a little with fine sand, and then it is ready for the gold.

They next cover over the metal with the mixture of gold and mercury, taking it up with a slip of copper, or a brush made of brass-wire, spreading it as even as possible, to do which they wet the brush from time to time in fair water. Then they set the metal to the fire, upon a grate, or in a sort of cage, under which stands a pan of coals; and in proportion as the mercury, evaporating and flying off, discovers the places where gold is wanting, they take care to supply them by adding new parcels of amalgama.

Then the work is rubbed over with the wire-brush, dipt in beer or vinegar, which leaves it in a condition to be brought to a colour, which is the last part of the process, and which the gilders keep to themselves as a mighty secret.

*The method of GILDING by fire on metal.*

To prepare the metal, they scratch it well, or rake it; then polish it with a polisher; and afterwards set it to the fire to blue, *i. e.* to heat, till it appear of a blue colour. When this has been done, they clap on the first lay of leaf gold, rubbing it lightly down with a polisher; and expose it thus to a gentle fire. They usually give it but three such lays, or four at the most, each lay consisting of a single leaf for common works, and of

two for extraordinary ones: after each lay, it is set a-fresh to the fire; and after the last lay, the gold is in condition to be burnished.

*To gild paper.* Grind bole-armoniac with rain-water, and give one laying of it; when it is dry, take glair of eggs, and add to it a little sugar-candy and gum-water, which lay over the former, and upon this, when it is dry enough, lay leaf-silver, or leaf-gold.

*To gild the leaves of books.* Take bole-armoniac, eight penny-weight; sugar-candy, two penny-weight: mix and grind them with glair of eggs: then on a bound book (while it is in the press, after it hath been smeared with glair of eggs, and is dried) smear the said composition, let it dry, then rub it well and polish it; then with fair water wet the edges of the book, and suddenly lay on the gold, press it down gently with cotton, let it dry, and then polish it with a tooth.

*GILDING of china or porcelain ware.* See the article PORCELAIN.

*GILL*, a measure of capacity, containing a quarter of a pint. See PINT and MEASURE.

*GILL* is also a name for ground-ivy, which, being infused in ale, makes what is known by the name of gill-ale; a sort of medicated ale, said to be absterive and vulnerary.

*GILLA VITRIOLI*, a name sometimes given to the emetic salt of vitriol. See the article VITRIOL.

*GILLINGEN*, a town of Swabia, eleven miles south of HAILBRON.

*GILLS*, *branchiæ*, in ichthyology. See the article BRANCHIÆ.

*GILOLO*, a large island of the Pacific ocean, lying between 1° south latitude and 2° north latitude, and between 125° and 128° east longitude.

*GILOLO* is also the name of the capital of the above island, situated in 40' north latitude.

*GILT-HEAD*, *aurata*, in ichthyology, the sharp-backed sparus, with a crooked gold-coloured line between the eyes. It is a very beautiful fish, the ground-colour of whose body is an olive-brown, but elegantly variegated with a number of different colours. See SPARUS.

*GILT-VARNISH.* See VARNISH.

*GIN*, or *GENEVA*, among distillers. See the article GENEVA.

*GIN*, in mechanics, a machine for driving piles, fitted with a windlass and winches at each end, where eight or nine men heave, and round which a rope is reeved, that

that goes over the wheel at the top : one end of this rope is seized to an iron-monkey, that hooks to a beetle of different weights, according to the piles they are to drive, being from eight to thirteen hundred weight ; and when hove up to a cross-piece, near the wheel, it unhooks the monkey, and lets the beetle fall on the upper end of the pile, and forces the same into ground : then the monkey's own weight over-hauls the windlafs, in order for its being hooked again to the beetle. See the article *ENGINE*.

**GINGEN**, an imperial city of Germany, twenty miles east of Ulm : east lon.  $10^{\circ}$ , and north lat.  $48^{\circ} 36'$ .

**GINGER**, *zinziber*, in botany. See the article *ZINZIBER*.

The root of this plant is too well known to need any description : it will be sufficient to observe, that it is of the tuberous kind, knotty, crooked, and irregular, and divaricated into many branches, of a pale yellowish colour when broken, and, like the *contrayerva*, of a fibrous structure. This root is of a very hot, acrid, and pungent taste; though aromatic withal, and of a very agreeable smell.

Ginger is too cheap to be sophisticated, and too well known to need any directions about the choice of it ; it may only be observed that the hardest and firmest pieces are the best. The Indians are very fond of ginger ; they eat both the young shoots of the leaves, and the roots themselves, cut small, in their sallads and broths ; and they make an excellent sweet-meat of them, preserving them with sugar. Ginger is an excellent carminative and stomachic ; it assists digestion, expels flatulencies, and takes off colic pains, often almost instantaneously. It is also highly esteemed by some as a cephalic, and is particularly said to strengthen the memory. It is often used as a corrective to purging medicines, and has the credit of being a great provocative to venery, especially in the preserved state. It may be given in powders, from two or three to ten, twelve, or fifteen grains ; but it is seldom given in such large doses, on account of its acrimony. It is used in decoctions from one dram to two or three, to the quart. It is an ingredient in the *venice-treacle*, *mithridate*, and *diacordium*, and in many other of the compositions of the shops ; and is very frequently used in carminative and stomachic powders, in extemporaneous prescription.

*Method of preserving GINGER.* Wash the ginger, and lay it to steep for ten or twelve days, in white-wine and water, stirring them every day ; then to a pound of roots allow two quarts of white-wine, and about a pint of lemon-juice ; boil these together for about a quarter of an hour : then add two pounds and a half of fine sugar, and boil it to a syrup, scumming it as it rises ; then set it by in a glazed pan till the next day, and afterwards boil it again in the syrup, for half an hour ; then set it by till the next day, when boiling it again, let it cool ; repeating this till the ginger is clear : after which put it into glasses, and cover them with paper.

This is a fine sweet-meat for the winter-season.

**GINGER-BREAD**, a richer kind of bread, the flavour and taste whereof are heightened and improved with spices, and particularly with ginger, whence the name.

The preparation of ginger-bread is as follows : grate two penny white loaves into two pounds of almonds well blanched and pounded ; then add two ounces of ginger, finely scraped, liquorice, and anise in powder, of each half an ounce ; add to these five or six spoonfuls of rosemary-water ; and knead all into a paste, with a pound of sugar, mould it, and roll it thin, then print it, and dry it in a stove. Others make it of treacle, citron, lemon, and orange-peel, with candied ginger, coriander, and caraway-seeds, mixed up with as much flour as will make it into a paste.

**GINGER-WINE** is made as follows : take three gallons of water, an ounce of rance-ginger, and three pounds of sugar ; boil them for an hour, and then put into it three lemons, and a little good yeast ; close up the vessel, and let it stand five days : if it has so worked as to be clear in that time, it may be bottled ; if not, let it stand longer, until it has worked sufficiently ; and in ten days after it may be drank.

**GINGIDIUM**, in botany, the name by which some call two different plants, a species of fennel and of thapsia. See the articles *FENNEL* and *THAPSIA*.

**GINGIVÆ**, the *GUMS*, in anatomy, a hard sort of flesh, investing the alveoli, or sockets of the teeth.

The gums consist of the common membrane of the mouth, and the periosteum of the jaws, to which they adhere very closely and firmly. They are furnished with

with a vast number of blood-vessels, whence their florid red colour; and they serve for the covering of the jaws, and the keeping the teeth fast in their sockets.

**GINGLYMUS**, γινγλυμος, one of the three subdivisions of that kind of articulation called diarthrosis. See the articles **ARTICULATION** and **DIARTHROSIS**.

The ginglymus is that juncture of the bones wherein they mutually receive and are received by one another, as is the case of the articulation of the humerus and cubitus. See **HUMERUS**, &c.

The ginglymus is again subdivided chiefly into three kinds; the first is when the same bone at the same extremity receives, and is reciprocally received by another bone, after the manner of an hinge, as that of the cubitus and humerus: the second is when a bone receives another at one of its extremes, and is received into another, as the vertebrae do: the third is that where a bone is received into another after the manner of a wheel, or the axis of the wheel in a box, such is that of the second vertebra of the neck in the first.

**GINSENG**, in botany. See the article **PANAX**.

The root of the ginseng is of an oblong figure, never growing to any great size, being generally about four or five inches long, and its thickness that of one's little finger. It is of a firm texture, its surface is furrowed and wrinkled in different places. It is of a brownish colour on the outside, and somewhat yellowish within; and is so pure and fine, that it seems transparent. The top of the root, when it is sent entire to us, is found composed of knots, or tubera, placed over one another in an irregular manner: these are formed of the bottoms of the decayed stalks of the several preceding years. When the root is fair and entire, it is easy to know by these how old it is; but very old roots not being so much in repute, the people who gather ginseng have often the precaution to cut off some, or even all those knobs, before they dry the root.

Ginseng is of a very agreeable and aromatic smell, tho' not very strong; its taste is acrid and aromatic, and has somewhat bitter in it. It is to be chosen sound and firm, moderately heavy, not too tough, and of a good smell. Before it be bought, it will be prudent to cut every root thro', for the Chinese, of whom we have it, fre-

quently find a way to introduce pieces of lead into it, to increase the weight.

The roots of the ginseng and ninzin are so much alike in their shape, colour, and virtues, that they are frequently mistaken for one another, and by the generality of authors understood to be the same, notwithstanding that they belong to two very different plants, and of two different genera. See the article **NINZIN**.

The Chinese and Tartars collect the root of this plant with infinite pains, at two seasons of the year, spring and autumn. They are forbid to touch them with any iron-instrument, so that they can only clean them with wooden knives. They wash them in a decoction of millet-seed, and afterwards hang them over the fumes of the same liquor, which they boil in considerable quantities for that purpose, in a close vessel, in the upper part of which the root is suspended, over the surface of the liquor: after this they dry it for use, thus it becomes transparent. The small fibres which are taken off, they boil in water, and make an extract of them, which they use in the same intention with the root.

The Chinese value the ginseng so highly, that it sells with them for three times its weight in silver. They, as well as the Asiatics in general, think the ginseng almost an universal medicine: they have recourse to it in all diseases, as the last remedy, and readily give themselves over when it will not cure them; but the virtues most generally ascribed to it, are those of a restorative, a provocative, and a cordial. It is famous in the east for giving strength to those who have disabled themselves by the too free use of women: there they also recommend it greatly in the small-pox, fevers of all kinds, disorders of the stomach and bowels, and tell us that diarrhoeas and dysenteries are cured by it: but they caution people not to give it in too large doses to persons of a florid sanguine constitution, on whatever occasion it may be necessary to them. The European physicians esteem it a good medicine in convulsions, vertiges, and all nervous complaints, and recommend it as one of the best restoratives known.

Its dose is from ten grains to twenty, in powder; and from one dram to two to the pint, in infusions.

**GIOVENAZZO**, a bishop's see in the kingdom of Naples, twelve miles west of Bari.

**GIRACE**, a city and port-town of Calabria, about thirty-six miles north-east of Reggio.

**GIRANDOLE**, a kind of branched candlestick. See the article **CANDLESTICK**.

**GIRDERS**, in architecture, some of the largest pieces of timber in a floor.

Their ends are usually fastened into summers and breast-summers, and joists are framed in at one end to the girders.

The size of girders and summers, upon the rebuilding of London, were ordained by act of parliament, to be in length from ten to twenty-six feet, in breadth from eleven to seventeen inches, and in depth from eight to fourteen inches. It was also ordained by the same statute, that no girder or summer should be less than ten inches in the wall, and that their ends should be laid in loam; as also that they be of good hearty oak, as free from knots as may be, because that will be the least subject to breaking, and may with more safety be relied on in this cross and transverse work.

**GIRDING-GIRT**, in the sea-language. A ship is girt, or hath a girding-girt, when her cable being so tight, or strained, upon the turning of the tide, she cannot get over it, but lies across the tide.

**GIRDLE**, *cingulum*, or *zona*, a belt or band of leather, or other matter, tied about the reins, to keep that part more firm and tight.

The Romans always wore a girdle, to tuck up the tunica, when they had occasion to do any thing: this custom was so general, that such as went without girdles, and let their gowns hang loose, were reputed idle dissolute persons.

It was antiently the custom among us, for bankrupts and other insolvent debtors to put off and surrender their girdle in open court; the reason whereof was, that our ancestors used to carry all their necessary utensils, as purse, keys, &c. tied to the girdle: whence the girdle became a symbol of the estate.

**Virgin-GIRDLE**. It was the custom among the Greeks and Romans, for the bridegroom to untie his bride's virgin-girdle, before he took her to his embraces. See the article **BRIDEGROOM**.

This girdle was made of sheeps-wool; it was tied in the herculean knot, and in bed the husband untied it, as a happy presage of his having as many children as Hercules, who at his death left seventy behind him. The poets attribute to Venus a particular kind of girdle, capable

of inspiring the passion of love. See the article **CÆSTUS**.

**Quicksilver-GIRDLE**, *cingulum sapientie*, in medicine, a sort of belt or girdle, invented by Rulandus, made with woollen-cloth sufficiently impregnated with quicksilver, killed with hog's lard.

This is sewed up in a linnen-cloth, which is applied to the skin, about the hypochondria, in disorders of the itch, phthiriasis, ulcers, and in cases where there is no absolute necessity for exciting a salivation. The patient's body must be kept warm, and defended from the cold of the external air, otherwise the belt, which is of itself highly safe, becomes very dangerous, as the access of the external cold during its use, according to Etmuller, endangers a salivation, petechial fever, or other disorders. Bartholine informs us, that this girdle proves mortal, when applied to patients who are either too young, weakened by diseases, or of a cacochymic habit of body.

**Christians of the GIRDLE**, the christians of Asia, particularly those of Syria and Mesopotomia, who to this day wear a large leathern girdle, being enjoined thereto by Motavakkel, tenth caliph of the family of the Abbassides, in the year 856, as a badge of their profession.

**Order of the GIRDLE**. See **CORDELIER**.

**GIRDLE**, in architecture. See **CINCTURE**.

**GIRGE**, a city of upper Egypt, on the west side of the Nile: east lon. 32°, and north lat. 26°.

**GIRGILIM**, in the materia medica, the same with the *sesamum*.

**GIRKIN**, a term used by gardeners for a small kind of cucumber. See **CUCUMBER**.

**GIRLE**, among sportsmen, denotes the roebuck in its second year.

**GIRONNE**, a large city and bishop's see of Spain, in the province of Catalonia, forty-five miles north-east of Barcelona: east lon. 2° 35', and north lat. 42°.

**GIRONNE**, or **GIRONNY**, in heraldry, a coat of arms divided into girones, or triangular figures, meeting in the center of the shield, and alternately colour and metal. See plate CXI. fig. 3.

**GIRT**, in the mensuration of timber, denotes the circumference of a tree. See the article **TIMBER**.

**GIRT**, among builders, a term sometimes used for fillet. See the articles **FILLET**.

**GIRTHS** of a saddle, the strong canvas-straps, which, being buckled under a horse's belly, serve to fix the saddle. See the article **SADDLE**.

**GISBORN**,

**GISBORN**, a market-town of Yorkshire, fifty miles west of York.

**GISBOROUGH**, another market-town of Yorkshire, thirty-seven miles north of York.

**GISCARA**, in botany, the name of a brasilian species of palm-tree.

**GISON**, or **GEISON**, in jewish antiquity, signifies, according to Josephus, a little wall, about breast high, made round the temple of Jerusalem, and round the altar of burnt sacrifices, to keep the people at a distance. This author, in his books of antiquities, makes the gison three cubits high, and but one in his history of the jewish war.

**GISORS**, a city of Normandy, in France, twenty-eight miles south-east of Rouen : east long.  $1^{\circ} 25'$ , north lat.  $50^{\circ} 10'$ .

**GITHAGO**, a name used by some for a species of lychnis. See **LYCHNIS**.

**GIVEN**, among mathematicians and philosophers, the same with data. See the article **DATA**.

**GIVET**, a town of the bishopric of Liege, twenty miles south of Namur.

**GIUSTANDIL**, a town of european Turkey, in the province of Servia : east long.  $24^{\circ}$ , north lat.  $43^{\circ}$ .

**GIULA**, a city of Hungary, subject to the house of Austria : east long.  $21^{\circ} 35'$ , north lat.  $46^{\circ} 38'$ .

**GLABELLA**, in anatomy, the name by which some call the space between the eye-brows, as being smooth and void of hair.

**GLACIS**, in building, an easy, insensible slope, or declivity.

The descent of the glacis is less steep than that of the talus. In gardening, a descent sometimes begins in talus, and ends in glacis. See the article **TALUS**.

The glacis of the corniche, is an easy imperceptible slope in the cymatium, to promote the descent and draining off the rain-water.

**GLACIS**, in fortification, that mass of earth which serves as a parapet to the covered way, sloping easily towards the champion, or field.

The glacis, otherwise called esplanade, is about six feet high, and loses itself by an insensible diminution in the space of ten fathoms. See **ESPLANADE**.

**GLADDON**, or **GLADWIN**, a plant called by botanists iris. See the article **IRIS**.

**GLADE**, in ornithology. See the article **GLEAD**.

**GLADE**, in gardening and agriculture, an opening and light passage made through

a wood, by lopping off the branches of trees along that way.

**GLADIATORS**, in antiquity, persons who fought generally in the arena at Rome, for the entertainment of the people.

The gladiators were usually slaves, and fought out of necessity; though sometimes freemen made profession thereof, like our prize-fighters, for a livelihood.

The Romans borrowed this cruel diversion from the Asiatics; and we find that the very priests had their *ludi pontificales*, and *ludi sacerdotales*. As from the earliest ages of antiquity we read that it was customary to sacrifice prisoners of war to the manes of the great men that fell in the engagement, in process of time, they came to sacrifice slaves at the funerals of all persons of condition; but as it would have appeared barbarous to cut their throats like beasts, they were appointed to fight with each other, and to do their best to save their own lives by killing their adversary. See the article **BUSTUARI**.

Hence arose the masters of arms called *lanistæ*, and men learned to fight. These *lanistæ* bought slaves to train up to this cruel trade, whom they afterwards sold to such as had occasion to exhibit shews. Junius Brutus, who expelled the kings, was the first that honoured the funeral of his father with these inhuman diversions at the sepulchre of the deceased; but afterwards they were removed to the circus and amphitheatres; and other persons, besides slaves, would hire themselves to this infamous office.

They were all first sworn that they would fight till death, and if they failed, they were put to death, either by fire, swords, clubs, whips, &c. It was usual with the people, or emperor, to grant them life when they shewed no signs of fear. Augustus decreed, that it should always be granted them.

From slaves and freed men, the wanton sport spread to persons of rank, as we find in Nero's time. And Domitian exhibited combats of women in the night-time: we also read, that dwarfs encountered with one another. Constantine the great first prohibited these combats in the east, but the practice was not entirely abolished in the west before Theodoric king of the Ostrogoths, in the year 500.

When any person designed to entertain the people with a shew of gladiators, he

set up bills in the public places, giving an account of the time, the number and names of the combatants, and the circumstances whereby they were to be distinguished; each having his several badge, which generally was a peacock's feather: they also gave notice what time the show would last; and sometimes gave representations of these things in painting, as is practised among us, by those who have any thing to show at fairs, &c. Upon the day appointed for the show, in the first place the gladiators were brought out all together, and obliged to take a circuit round the arena in a very solemn and pompous manner. After this, they proceeded, *paria componere*, to match them by pairs, in which great care was taken to make the matches equal. The first sort of weapons they made use of were staves, or wooden files, called *rudes*, and the second were effective weapons, as swords, poniards, &c.

The first were called *arma lusoria*, or *exercitoria*; the second, *decretoria*, as being given by decree or sentence of the prætor, or of him at whose expence the spectacle was exhibited.

They began to fence or skirmish with the first, which was to be the prelude to the battle, and from these, when well warmed, they advanced to the second, with which they fought naked. The first part of the engagement was called *ventilare*, *præludere*; and the second *dimicare ad certum*, or *versis armis pugnare*.

When any received a remarkable wound, either his adversary or the people used to cry out, *babet*, or *hoc habet*. If the vanquished surrendered his arms, it was not in the victor's power to grant him life: it was the people during the time of the republic, and the prince or people during the time of the empire, that were alone empowered to grant this boon. The two signs of favour and dislike given by the people, were *premere pollicem*, and *vertere pollicem*, the former of which M. Dacier takes to be a clenching of the fingers of both hands between one another, and so holding the two thumbs upright close together, was a sign of the people's admiration of the courage shewn by both combatants; and at the same time for the conqueror to spare his antagonist's life: but the contrary motion, or bending back of the thumbs, signified the dissatisfaction of the spectators, and authorised the victor to kill the other

combatant downright for a coward. The emperor saved whom he liked, if he was present at the solemnity, in the same manner.

After the engagement, several marks of favour were conferred on the victor, particularly a branch of palm-tree; and oftentimes a sum of money, perhaps gathered up among the spectators: but the most common rewards were the *pileus* and the *rudis*; the former being given only to such gladiators as were slaves, for a token of obtaining their freedom; but the *rudis* seems to have been bestowed both on slaves and freemen, with this difference, that it procured the former no more than a discharge from any further performance in public, upon which they commonly turned *lanista*: but the *rudis*, when given to such persons as, being free, had hired themselves out for these shows, restored them to a full enjoyment of their liberty. See the articles *PILEUS*, *RUDIS*, and *LANISTA*.

There were divers kinds of gladiators distinguished by the weapons, manner, time of fighting, &c. such were the *andabata*, *cateruarii*, *consummati*, *cubicularii*, *dimachæ*, *ficales*, &c.

**GLADIOLE**, *gladiolus*, in botany, a genus of the *triandria-monogynia* class of plants, the flower of which consists of six petals that unite at their bases: the fruit is an oblong, trilocular capsule, containing a great many triangular seeds.

The root of gladiolus, or the common corn-flag, is accounted discutient, and good in malignant and pestilential cases.

**GLADIUS**, a sword; whence *jus gladii*, or right of the sword, is used in our ancient latin authors, and in our norman laws, for supreme jurisdiction: and it is probably from hence that, at the creation of an earl, he is *gladio succinctus*, to denote his having a jurisdiction over the county.

**GLADIUS-PISCIS**, a fish more usually called xiphias. See the article *XIPHIAS*.

**GLAMA**, a species of peruvian camel, with the back even, and the breast gibbous. See the article *CAMEL*.

**GLAMORGANSHIRE**, a county of south Wales, bounded by Brecknockshire on the north, and by the Bristol channel on the south. Its capital is Landaff.

**GLAND**, in anatomy, a small body, formed by the interweaving of vessels of every kind, covered with a membrane, usually provided with an excretory duct, and destined to separate some particular fluid from



from the mass of blood, or to perfect the lymph. See BLOOD and LYMPH.

Many of the anatomical writers of the very first class, and among these some who have written professedly of the glands, and have made it their peculiar business to examine nicely into their nature, and explain their structure, have yet, from mere difficulty of ascertaining adequate ideas of the term, evaded giving a definition or general description of the glands; and in consequence of this, numberless errors, and an almost inextricable confusion, has crept into the study of this important part of the human structure.

Other authors, who have had more boldness, if not greater abilities than those who have avoided meddling with definitions of these parts, have ventured to establish what they call glands: but these differ so much from one another in what they would establish as general certainty, and have produced such imperfect and erroneous definitions, that they have all either included parts which themselves own not to be glands in the definition, or they have limited the term to some particular ones, and excluded what themselves and every body else allow to be glands out of the number.

Glands are parts of a peculiar structure: they are of various figures, colours, and consistencies, as they are destined to different offices. The antients supposed them formed of a different kind of flesh from that of the rest of the body; but the parts to which they have given the name of glands, though they are as different from one another as possible in figure, size, and colour, yet they are easily known, and distinguished as glands by all the world; notwithstanding the difficulty of giving a definition or even a general character of a gland, which shall include all the true glands, and take in no other parts of the body with them.

Many writers on this subject have asserted, that wherever there is a secretion of any kind performed, there is a gland; but this is not true, for there are many secretions performed in the body, and those even of the largest and most important kind, where there are no glands to perform them: the chyle is secreted in the intestines without the assistance of glands; the semen is secreted in the testicles; and the pituita in the pituitary sinuses of the brain, where there are no

glands at all. On the other hand also it is to be observed, that there are glands received and allowed by all writers as such, which do not appear to perform any secretions at all; and the antients themselves agreed in giving the name of glands to several parts, though they were not assured that they secreted any thing, nor even in some cases believed that they did. But Mery, in several papers in the Memoirs of the Paris Academy, not only proves that all the secretions are not performed by means of glands, but that many of the secretions of most importance to the body are performed without glands. We are to add also, that every beginner in anatomy, at this time, knows a gland to be such when he sees it, without knowing any thing of its use. There are therefore other characters by which a gland may be known, though by its office and use it cannot.

Other writers, of the number of whom is the great Malpighi, in dissections of particular bodies, having found vesicles in the brain, liver, kidneys, and other parts of the body, thence declared them to be glandulous in their structure: but in these cases, the bodies dissected were all morbid ones; and as the same vesicles are not found in healthy ones, nor indeed any thing analogous to them, it is a sufficient proof that they are not natural parts of their structure; and besides, vesicles and glands are different. See VESICLE and VASCULOUS.

It is evident that the antients called certain parts of the human body glands, and that for no other reason but because they found them composed of a peculiar kind of fleshy substance, of a peculiar habit, or external appearance, without paying any the least regard either to their internal structure, their spherical figure, (by which character some define them) or their use.

If it be asked, says Heister, what this particular habit in the glands is? or how we are to know it? the answer is, that the peculiar complication and arrangement of the vessels, from which there arises a form obviously distinguishable at sight from the muscles, the fat, the bones, the membranes, the vessels, and in fine from every other part of the human fabric, which gives a sufficiently certain, determinate and striking notice of it.

The differences of the glands among themselves, as established by many authors, are very numerous: it will not be necessary to

to run into the whole disquisition ; we shall only select a few which are more generally established than the rest, and of more immediate and real use. We shall first divide them into two general kinds, the simple, called also conglobate glands, and the conglomerate. See the articles CONGLOBATE and CONGLOMERATE.

The glands differ also greatly in regard to their consistence: some of them are considerably hard and firm, and others extremely soft and tender: of the latter kind in particular are the glands situated in the articulations of the bones of the several parts of the body.

They differ also very considerably in colour. Some of them are of a pale, whitish, red, or fleshy colour; others of a strong, deep red; others yellowish, or brownish, and some evidently blackish.

Their differences in figure are as considerable also as those in colour: some of them are round, others oval, others oblong, and many others of figures as different as well can be from any one of these regular ones: the pancreas, the thyroide, and the thymus, are instances of this: some of them have obtained their names from their peculiar figure: of this number are the glandula pinealis, the miliaries, and others. See the articles PANCREAS, THYROIDE, THYMUS, &c.

*The uses of the GLANDS* are also as different as their colours or figures: some of them are salival, mucose, and lymphatic; others are mucilaginous, sebaceous, and waxy; others lachrymal, pituitary, &c. and from these their several contents or secretions, they are termed lachrymal, &c. see the articles SALIVAL, LYMPHATIC, MUCILAGINOUS, &c.

*The situation of the GLANDS* is another article in which they differ, and from which many of them have their several names; such are the parotides, maxillares, linguales, thyroide, palatine, labial, jugular, cervical, axillary, inguinal, lumbar, intestinal, mesenteric, renal, &c. See the articles PAROTIDE, MAXILLARY, LINGUAL, &c.

And, finally, the size of the glands is a thing in which they differ most obviously and essentially.

*Of the GLANDS in particular.* The particular glands of the body, or such as are truly and properly of this denomination, are, according to Heister, as follow; and first of the glands of the head.

In the sinuses of the dura mater, and out

of them, at the sides, there are found a number of small glands described by Pacchionius; and there are sometimes others visible in the foveæ of the os frontis, and about the divisions of the vessels, between the dura mater and the arachnoides. These glands seem destined for the secreting of a fluid to moisten the dura mater. Other glands of the brain are the pineal gland, and the pituitary gland. See the articles PINEAL, PITUITARY, DURA MATER, and BRAIN.

In the exterior part of the head, that is, out of the cavity of the skull, we have the parotids, the maxillary glands, the sublinguals, the linguals; the labials, the palatine, and the buccinals, which are distributed here and there about the membrane of the mouth; and are each described in their places. In the orbit also there is the lachrymal glands; under the eyes are the sebaceous or seraceous glands, the tonsils in the fauces, the mucose glands in the pituitary membrane of the nostrils, and the ceruminose glands of the ears, each of which are described under their several heads. See the articles EYE and EAR.

The principal gland of the neck is the thyroides, besides which there are also found in the neck a great number of lesser ones, distributed here and there among the muscles and fat. Their figure, their number, and their situations, vary in different subjects; but in general those in the anterior part of the neck are called jugulars; and those in the hinder part, occipitales and cervicales. The use of these is hitherto uncertain; it is generally supposed that they are of service to the lymphatic vessels, but what sort of use they can be of to them, does not so easily appear. See the articles THYROIDES, JUGULARES, OCCIPITALES, CERVICALES, and NECK.

Ruysh and Morgagni have also described and figured glands in the epiglottis: and Morgagni has described others in the other parts of the larynx, particularly about the arytenoide cartilages, as also in the trachea: but these are often so small, that they are scarce discoverable in dissection.

The oesophagus, especially towards its upper part, has a great number of glands; and it is common to find a little aperture or osculum in the center of each, which has much the appearance of an excretory duct.

In the thorax we meet with the gland thymus;

thymus; as also with the glandulæ bronchiales: these last are very observable glands, situated externally in the larger divisions of the trachea and bronchia. They are of a blackish colour; and their use, like that of many others of the glands of this part of the body, is yet very little known. It had been long supposed that they served to secrete a liquid which they discharged into the bronchia, for the lubricating and moistening these parts; but Vercellonius will have it, that they secrete a fluid whose use is to be assistant in the digestion of our food, and that they discharge it into the oesophagus through certain extremely minute ducts. See the articles THORAX, THYMUS, BRONCHIA, &c. About the fifth vertebra of the back, there is sometimes found in the thorax a remarkable gland adhering to the posterior part of the oesophagus: this is usually called glandula dorsalis. It is, in different subjects, of various sizes. It is often of the size of a kidney-bean; sometimes of that of an almond, and sometimes considerably larger; in others, it is much less than the smaller, and sometimes it is wholly wanting; or at least so extremely minute and inconsiderable, that the best dissectors are not able to find it. Sometimes also two glands are found in this part in the place of one. Vercellonius is of opinion, that this gland is also placed there for the secretion of a fluid serving to assist the digestion of our food in the stomach: but Fantonus, and some others, suppose, that these glands discharge a fluid of a mucous nature into the cavity of the oesophagus: several authors affirm, that in dogs these glands are found tumid, and inhabited by a number of oblong and slender red worms. See DORSUM, VERTEBRA, and OESOPHAGUS. In the abdomen there are very considerable numbers of glands: the largest of them is the pancreas; after this in size come the glandulæ renales, or capsulæ atrabiliaræ; after these the mesenterics, and the intestinals of Brunner and Peyer in the intestines. See ABDOMEN, &c. The glands of the stomach are very easily distinguishable in dogs and hogs; but in human subjects, it is difficult to find them: many anatomists have doubted them. Morgagni, however, discovered them so fairly in human subjects, that there is no doubt left about them.

About the vertebra of the loins, near

where the receptaculum chyli is situated, and about the os sacrum, and the divisions of the iliac vessels, are many glands of various sizes and figures: they are commonly called lumbares, sacræ, and iliacæ, and they have numerous lymphatics entering into them, and discharging their contents into the receptaculum chyli. The lumbar glands have been sometimes found swelled to the bigness of a man's fist.

In the concave part of the liver, about the ingress of the vena portæ and the neck of the gall-bladder; as also about the spleen, near the ingress of the vessels, there are frequently found conglobate glands, of about the bigness of a kidney-bean: these are called by authors hepatic glands, cystic glands, and by other names formed from the names of the parts they are near; and they seem to serve the lymphatic vessels. See LIVER.

About the left orifice of the stomach, there sometimes also is found, according to Vercellonius, a gland which he says is equal to a kidney-bean in size; he also says that it has ducts opening into the cavity of the stomach. In hogs this gland is very conspicuous, but in human subjects it is not so.

Many authors have told us, that in the omentum, in every part where the fat lies, there are a number of glands whose office it is to secrete it. Dissection shews us a few about that part where it is joined to the pylorus; and as to the rest, it is not necessary that there should be glands, because there is fat: for that may be, and is, indeed, in great abundance secreted immediately from the arteries.

In the gall-bladders of oxen there are often found a number of small glands of a yellow colour, not unlike the ceruminous glands in the auditory passage. In human subjects the same kind of glands are also sometimes found. The bladder and the ureters have also sometimes a number of small glands, but they are very indeterminate in number and size, and are not always indeed found in the same place, especially about the ureters. Those about the bladder are usually situated towards the neck of it, and are sometimes tolerably conspicuous.

In the parts of generation of man there occur, 1. The glandulæ Cowperii. 2. The glandulæ Littri. And, 3. The odorous glands of Tyson. See PENIS.

As to the latter ones, those of them which are situated in the interior part of the prepuce, are much more obvious than those about the coronæ penis, where it is very difficult to distinguish them from the nervous papillæ of the same part.

4. We meet with the prostratæ. 5. The glands of the vesiculæ feminales: but these are rarely seen distinct. Terraneus also describes six small glands in the urethra virilis. See the articles PREPUCE, PROSTRATÆ, VESICULÆ SEMINALES, and URETHRA.

In the parts of generation in women, we are to refer to the number of the glands.

1. Those which Morgagni discovered in the nymphæ: these have a very near alliance with the glandulæ odoriferæ of the penis in men. 2. Authors tell us of glands in the female as well as the male urethra: but the dissector will find only little foramina and ducts in the place of them. 3. About the extremity of the urethra, however, in the vagina, there are sometimes found evident glands, situated beneath them: these, as well as the glands of the nymphæ, are often very turgid in the time of parturition. 4. The vesicles sometimes met with near the internal orifice of the uterus, and taken by some for a new ovary, are not properly glands, tho' some people have been very positive that they were such; having nothing of the habit and peculiar appearance of glands, and being in truth only vesicles. 5. Some have also maintained that there are glands in the uterus, by which the menstrual discharges are secreted; but this notion arises only from the false hypothesis, that where there are no glands, there can be no secretion. See the articles VAGINA and UTERUS.

Among the glands which belong to the articulations, and the extremities, we are to mention first the axillary ones. 2. The inguinal glands; these last, being situated on each side in the groin near the crural vessels, are in various diseases apt to grow tumid, and inflamed. Abscesses are often formed in them; but their use in the body is not easily understood. 3. The glands, called from their discoverer glandulæ haverianæ, in the articulations: they are also called from the matter they secrete glandulæ mucosæ. These are the softest of all the glands in the body; they secrete a mucous soft fluid, which serves to lubricate the joints, and render their motions easy, and to

prevent their growing dry, and cohering together.

About the scapula, the flexure of the elbow, the hand, the knee, and the foot, there are also found here and there some small glands; as also in some places between and among the muscles: but as their number and situation, as well as their size and figure, are very uncertain and variable, it is not necessary to recount them here.

We are, however, yet to speak of the cutaneous glands. Verheyen tells us, that Steno had discovered, that there is a gland situated under every distinct pore of the skin, from whence there arises a vessel for the conveyance of the matter of sweat, which terminates at the surface of the cutis: and hence Verheyen, though he does not say that he had ever seen any of these glands himself, ventures to give them a place among the parts he describes; and calls them subcutaneous glands. The pores of the skin are so extremely numerous, that if, according to these authors, there were a gland belonging to every one of them, the glands must be almost infinite in number. But in dissection, when the cutis has been carefully cleared from the fat that is under it, it is certain no such glands are seen, either in the separated fat, or on the lower surface of the cutis: there are indeed always found little portions of the fat here and there insinuating themselves into the little foveolæ, or holes in the cutis; but pieces of fat will be distinguished from glands, with very little difficulty by an expert anatomist. From this, and from innumerable searches after these glands, it appears, that there are indeed no such glands as those called subcutaneous. See the article CUTIS.

GLANDERS, in the manege, a disease in horses, consisting of a thick, slimy, corrupt humour, running from the nostrils, of a different colour, according to the different degrees of malignity, or as the infection has been of a shorter or longer continuance; being white, yellow, green, black, or bloody.

Authors ascribe this disease to various causes: some to infection; others, to a disorder of the lungs; others, to the spleen; some to the liver; and others, to the brain. After it has been of so long a standing, as that the matter is become of a blackish colour, which is usually in  
its

its last stage, they suppose it to come from the spine; and hence they call it the mourning of the chine.

Kernels and knots are usually found under the caud in this disorder; and as these grow bigger and more inflamed, so the glands increase more.

For the cure of the glander's, Mortimer gives the following receipt.

Take a pint of children's chamber-lye, two ounces of oil of turpentine; half a pint of white wine vinegar; four ounces of flower of brimstone; half a handful of rue: boil this composition till it comes to a pint, and give it to the horse fasting; and let him fast after it six hours from meat, and twelve from water.

**GLANDIVES**, a city and bishop's see of Provence, in France, situated on the river Var, twenty-six miles north-west of Nice: east long.  $6^{\circ} 40'$ , north lat.  $44^{\circ}$ .

**GLANDULAR**, or **GLANDULOUS**, among anatomists. See **GLANDULOUS**.

**GLANDULE**, **GLANDULA**, a term used by anatomists to express a small gland. See the article **GLAND**.

**GLANDULOUS**, something abounding with, or partaking of the nature of glands. See the article **GLAND**.

**GLANDULOUS BODY**, *glandulosum corpus*, a name by which some call the prostate. See the article **PROSTATA**.

**GLANDULOUS ROOTS**, among gardeners, &c. denote such tuberosc ones as are connected together by small fibres. See the article **ROOT**.

**GLANIS**, γλάνις; a fish called in english, the sheat-fish: it is a species of silurus with four cithi on the lower jaw. See **SILURUS**.

**GLANS**, **ACORN**, in natural history. See **ACORN**.

**GLANS**, in anatomy, the anterior extremity of the penis, called by other different names, as the head of the penis, the nut of the penis, and the balanus of the penis. See the article **PENIS**.

The glans is composed of the epidermis and the corpus cavernosum, which is continuous with the urethra. See the articles **EPIDERMIS** and **CORPUS**, &c.

Its surface is very smooth and polished, and is very sensible to the touch, which is owing to a multitude of nervous papillæ distributed all over it; and are most obvious when the penis is erected. In the front of it is the urethra, and immediately under is inserted the frænum or frenulum of the penis. The posterior extremity of the glans, with its neck be-

hind, is distinguished by the name of the corona. See the article **CORONA**.

**GLANS** is also used to denote the tip or extremity of the clitoris, from its resemblance both in form and use to that of the penis. The principal difference consists in this, that it is not perforated as is the glans of the penis. This glans is also covered with a preputium formed of the inner membrane of the labia. See the article **CLITORIS**.

**GLANS** is also taken for strumous, or scrophulous tumors.

It also signifies a suppository, or pessary.

**GLANUS**, or **GLANIS**. See **GLANIS**.

**GLAREA**, in natural history, a kind of impalpable sand. See the article **SAND**.

**GLARIS**, the capital of one of the cantons of Switzerland, of the same name; the inhabitants of which are both protestant and popish: it is situated thirty-five miles south-east of Zurich, in east long.  $9^{\circ}$ , and north lat.  $47^{\circ}$ .

**GLASGOW**, a large city of Scotland, in the shire of Lanerkschire, or Clydesdale; situated on the river Clyde, twenty miles north-west of Lanerk, and forty miles west of Edinburgh, in  $4^{\circ} 8'$ , west long. and  $55^{\circ} 5'$ , north lat.

This is one of the most elegant towns in Scotland. It has an university, and a good foreign trade.

**GLASS**, vitrum, a transparent, brittle, factitious body, produced by the action of fire upon a fixt salt and sand, or stone, that readily melts.

The chemists hold, that there is no body but may be vitrified, or converted into glass; being the last effect of fire, as all its force is not able to carry the change of any natural body beyond its vitrification.

*Antiquity and history of GLASS.* When, or by whom, the art of making glass was first found out is uncertain: some will have it invented before the flood; but without any proof. Neri traces the antiquity of this art as far back as the time of Job: but Dr. Merret will have it as ancient as either pottery, or the making of bricks: because that a kiln of bricks can scarce be burnt, or a batch of pottery be made, but some of the bricks and the ware will be at least superficially turned to glass; so that it must have been known at the building of Babel, and as long before as the making of bricks was used. It must have been known, consequently, among the Egyptians, when the Israelites were employed by them in making bricks:

Of this kind, no doubt, was that fossil glass mentioned by Ferrant. Imperat. to be found under-ground in places where great fires had been. The Egyptians indeed boast, that this art was taught them by the great Hermes. Aristophanes, Aristotle, Alexander Aphrodiseus, Lucretius, and John the divine, put us out of all doubt, that glass was in use in their days.

Pliny relates, that it was first discovered accidentally in Syria, at the mouth of the river Belus, by certain merchants driven thither by a storm at sea, who, being obliged to continue there, and dress their victuals, by making a fire on the ground, where there was great plenty of the herb kali; that plant burning to ashes, its salts mixed and incorporated with sand, or stones fit to vitrify, and produced glass: that this accident being known, the people of Sidon, in that neighbourhood, assayed the work, improved the hint, and brought it into use; and that this art has been improving ever since.

Venice, for many years, excelled all Europe in the fineness of its glasses, but of late the French and English have excelled the Venetians, so that we are no longer supplied with this commodity from abroad.

*Nature and characters of GLASS.* Naturalists are divided in what class of bodies to rank glass: some making it a concrete juice; others a stone; others again rank it among semi-metals; but Dr. Merret observes, that these are all natural productions, whereas glass is a factitious compound, produced by fire, and never found in the earth, but only the sand and stone that form it; that metals are formed by nature into certain species; and that fire only produces them, by its faculty of separating heterogeneous, and uniting homogeneous bodies: whereas it produces glass, by uniting heterogeneous matter, viz. salt and sand, of both which it evidently consists; 100 lb weight of sand yielding above 150 lb of glass.

The same learned doctor gives us a precise and accurate enumeration of the several characters, or properties of glass, whereby it is distinguished from all other bodies, viz. 1. That it is an artificial concrete of salt and sand, or stones. 2. Fusible by strong fire. 3. When fused, tenacious and coherent. 4. It does not waste nor consume in the fire. 5. When

melted, it cleaves to iron. 6. When it is red hot, it is ductile, and may be fashioned into any form; but not malleable; and capable of being blown into a hollowness, which no mineral is. 7. Frangible when thin, without annealing. 8. Friable, when cold. 9. Diaphanous, whether hot or cold. 10. Flexible and elastic. 11. Dissoluble by cold and moisture. 12. Only capable of being graven or cut with a diamond, or other hard stone, and emery. 13. Receives any dye or colour both externally and internally. 14. Not dissoluble by aqua fortis, aqua regia, or mercury. 15. Neither acid juices nor any other matter extract either colour, taste, or any other quality from it. 16. Admits of polishing. 17. Neither loses weight nor substance by the longest and most frequent use. 18. Gives fusion to other metals, and softens them. 19. The most pliable thing in the world, and that which best retains the fashion given it. 20. Not capable of being calcined. 21. An open glass being filled with water in the summer-time, will gather drops of water on the outside, just so far as the water on the inside reaches; and a person's breath blown on it will manifestly moisten it. 22. Little glass balls filled with water, mercury, and other liquor, and thrown into the fire; as also drops of green glass being broken, will fly asunder with a great noise. 23. Neither wine, beer, nor any other liquor, will make it musty, or change its colour, or rust it. 24. It may be cemented, as stones and metals. 25. A drinking-glass, partly filled with water, and rubbed on the brim with a wet finger, yields musical notes, higher or lower as the glass is more or less full, and will make the liquor frisk and leap.

*Materials for making of GLASS.* The materials whereof glass is made, we have already mentioned to be salt and sand, or stones. The salt here used, is procured from a sort of ashes, brought from the Levant, called pulverine, or rochetta; which ashes are those of a sort of water-plant, called kali, cut down in summer, dried in the sun, and burnt in heaps, either on the ground, or on iron-grates; the ashes falling into a pit, grow into a hard mass, or stone, fit for use. See KALI and PULVERINE. To extract the salt, these ashes, or pulverine, are powdered and sifted, then put into boiling water, and there kept till one third of the water be consumed; the whole

whole being stirred up, from time to time, that the ashes may incorporate with the fluid, and all its salts be extracted : then the vessel is filled up with new water, and boiled over again, till one half be consumed ; what remains is a sort of lee, strongly impregnated with salt. This lee, boiled over again in fresh coppers, thickens in about twenty-four hours, and shoots its salt ; which is to be laded out, as it shoots, into earthen pans, and thence into wooden fats to drain and dry. This done, it is grossly pounded, and thus put in a sort of oven, called calcar, to dry. It may be added, that there are other plants, besides kali, which yield a salt fit for glass : such are the alga or sea-weed, the common way-thistle, bramble, hops, wormwood, woad, tobacco, fern, and the whole leguminous tribe, as pease, beans, &c. See the articles *ASHES*, *SALT*, *EXTRACTION*, *ALGA*, &c.

The sand or stone, called by the artists Tarso, is the second ingredient in glass, and that which gives it the body and firmness. These stones, Agricola observes, must be such as will fuse ; and of these such as are white and transparent are best ; so that crystal challenges the precedence of all others. See the articles *CRYSTAL* and *TARSO*.

At Venice they chiefly use a sort of pebble, found in the river Tesino, resembling white marble, and called cuogolo. Indeed Ant. Neri assures us, that all stones which will strike fire with steel, are fit to vitrify : but Dr. Merret shews, that there are some exceptions from this rule. Flints are admirable ; and when calcined, powdered, and seared, make a pure white crystalline metal : but the expence of preparing them makes the masters of our glass-houses sparing of their use. Where proper stones cannot be so conveniently had, sand is used ; which should be white, and small, and well washed, before it be applied : such is usually found in the mouths and sides of rivers. Our glass-houses are furnished with a fine sand for crystal, from Maidstone, the same with that used for sand-boxes, and in scouring ; and with a coarser for green glass from Woolwich. For crystal glass, to 200 lb of tarso, pounded fine, they put 130 lb of salt of polverine ; mix them together, and put them into the calcar, a sort of reverberatory furnace, being first well heated. Here they remain baking, frying, and calcining, for five hours, during which

the workman keeps mixing them with a rake, to make them incorporate : when taken out, the mixture is called frit, or bollito. See the articles *FRIIT* and *BOLLITO*.

It may be further observed, that glass might be made by immediately melting the materials without thus calcining, and making them frit : but the operation would be much more tedious.

A glass much harder than any prepared in the common way may be made by means of borax, in the following manner. Take four ounces of borax, and an ounce of fine white sand, reduced to powder, and melt them together in a large close crucible set in a wind furnace, keeping a strong fire for half an hour : then take out the crucible, and when cold, break it ; and there will be found at the bottom a hard, pure glass, capable of cutting common glass almost like a diamond. This experiment duly varied, says Dr. Shaw, may lead to some considerable improvements in the art of glass, enamels, and artificial gems. It shews us an expeditious method of making glass without the use of fixed salts, which has generally been thought an essential ingredient in glass, and which is the ingredient that gives common glass its softness ; and it is not yet known, whether calcined crystal, or other substances, being added to this salt, instead of sand, it might not make a glass approaching to the nature of a diamond. See the article *GEM*.

*Kinds of GLASS*. Of these materials we have many sorts of glass made, which may principally be distinguished according to their beauty ; as the crystal flint glass, the crystal white glass, the green glass, and the bottle glass. Again these sorts are distinguished by their several uses ; as plate or coach-glasses, looking-glasses, optic-glasses, &c. which are made of the first sort. The second sort includes crown-glass, toys, phials, drinking-glasses, &c. The third sort is well known by its colour, and the second by its form.

*Bleas coloured GLASS* is made thus : put into a pot crystal frit, thrice washed in water ; tinge this with manganese prepared into a clear purple : to this add alumen cativum sifted fine in small quantities, and at several times ; this will make the glass grow yellowish, and a little reddish, but not blackish, and always dissipates the manganese. The last time you add manganese, give no more of the alumen cativum, unless the colour

be too full. Thus will the glass be exactly of the colour of the balas-ruby.

**Red GLASS.** A blood-red glass may be made in the following manner: put six pounds of glass of lead, and ten pounds of common glass into a pot glazed with white glass: when the whole is boiled and refined, add, by small quantities, and at small distances of time, copper calcined to a redness, as much as, on repeated proofs, is found sufficient: then add tartar in powder by small quantities at a time, till the glass is become as red as blood; and continue adding one or other of the ingredients till the colour is quite perfect.

**Yellow GLASS.** It is a necessary remark in glass-making, that the crystal-glass made with salt that has an admixture of tartar will never receive the true gold yellow, though it will all other colours: for yellow glass, therefore, a salt must be prepared from poverine, or pot-ashes alone, to make the glass.

**Furnaces for the making GLASS.** In this manufacture, there are three sorts of furnaces, one called calcar, is for the frit, the second is for working the glass, the third serves to anneal the glass, and is called the leer. See FURNACE.

The calcar A, (plate CXIII. fig. 3.) resembles an oven ten feet long, seven broad, and two deep: the fuel, which in England is sea coal, is put into a trench on one side of the furnace; and the flame reverberating from the roof upon the frit, calcines it. The glass-furnace, or working-furnace B, is round, of three yards diameter, and two high; or thus proportioned. It is divided into three parts, each of which is vaulted. The lower part C is properly called the crown, and is made in that form. Its use is to keep a brisk fire of coal and wood, which is never put out. The mouth of it is called the bocca. There are several holes in the arch of this crown, through which the flame passes into the second vault, or partition, and reverberates into the pots filled with the ingredients above-mentioned. Round the insides are eight or more pots placed, and piling pots on them. The number of pots is always double that of the boccas D, or mouths, or of the number of workmen, that each may have one pot refined to work out of, and another for metal to refine in, while he works out of the other. Through the working holes the metal is taken out of the pots, and the

pots are put into the furnace, and these holes are stopped with moveable covers made of lute and brick, to screen the workmens eyes from the scorching flames. On each side of the bocca, or mouth, is a boccarella, or little hole, out of which coloured glass, or finer metal, is taken from the piling pot. Above this oven, there is the third oven or leer, about five or six yards long, where the vessels, or glass, is annealed, or cooled: this part consists of a tower, besides the leer F, into which the flame ascends from the furnace. The tower has two mouths, through which the glasses are put in with a fork, and set on the floor or bottom: but they are drawn out on iron pans, called fraches, through the leer, to cool by degrees; so that they are quite cold by the time they reach the mouth of the leer, which enters the sarosel, or room where the glasses are to be stowed.

But the green glass furnace is square; and at each angle it has an arch for annealing, or cooling the glasses. The metal is wrought on two opposite sides, and on the other two they have their colours, into which are made linnet holes, for the fire to come from the furnace to bake the frit, and to discharge the smoke. Fires are made in the arches to anneal the work, so that the whole process is done in one furnace.

These furnaces must not be of brick, but of hard sandy stones. In France, they build the outside of brick, and the inner part to bear the fire is made of a sort of fuller's earth, or tobacco-pipe clay, of which earth they also make their melting-pots.

Mr. Blancourt observes, that the worst and roughest work in this art, is the changing the pots, when they are worn out, or cracked. In this case the great working hole must be uncovered; the faulty pot must be taken out with iron hooks and forks, and a new one must be speedily put in its place, thro' the flames, by the hands only. For this work, the man guards himself with a garment made of skins, in the shape of a pantaloons, that covers him all but his eyes, and is made as wet as possible: the eyes are defended with a proper sort of glass.

**Instruments for making of GLASS.** The instruments made use of in this work, may be reduced to these that follow. A blowing pipe, made of iron, about two feet and a half long, with a wooden handle. An iron rod to take up the glass,



glass, after it is blown, and to cut off the former. Scissars to cut the glass when it comes off from the first hollow iron. Shears to cut and shape great glasses, &c. an iron ladle, with the end of the handle cased with wood, to take the metal out of the refining pot, to put it into the workmens pots. A small iron ladle, cased in the same manner, to skim the alkalic salt, that swims at top. Shovels, one like a peel to take up the great glasses ; another, like a fire-shovel, to feed the furnace with coals. A hooked iron fork, to stir the matter in the pots. An iron rake for the same purpose, and to stir the frit. An iron fork, to change or pull the pots out of the furnace, &c.

*Working or blowing round GLASS.* The tools thus provided, the workman dips his blowing pipe into the melting-pot, and by turning it about, the metal sticks to the iron more firmly than turpentine. This he repeats four times, at each time rolling the end of his instrument, with the hot metal thereon, on a piece of iron G, over which is a vessel of water which helps to cool, and so to consolidate, and to dispose that matter to bind more firmly with what is to be taken next out of the melting-pot. But after he has dipt a fourth time, and the workman perceives there is metal enough on the pipe, he claps his mouth immediately to the other end of it H, and blows gently through the iron tube, till the metal lengthens like a bladder about a foot. Then he rolls it on a marble stone I, a little while, to polish it, and blows a second time, by which he brings it to the shape of a globe of about eighteen or twenty inches diameter. Every time he blows into the pipe, he removes it quickly to his cheek, otherwise he would be in danger, by often blowing, of drawing the flame into his mouth ; and this globe may be flattened by returning it to the fire, and brought into any form by stamp-irons, which are always ready. When the glass is thus blown, it is cut off at the collet, or neck, which is the narrow part that stuck to the iron. The method of performing this, is as follows : the pipe is rested on an iron bar, close by the collet : then a drop of cold water being laid on the collet, it will crack about a quarter of an inch, which with a slight blow, or cut of the shears K, will immediately separate the collet.

After this is done, the operator dips the iron rod into the melting-pot, by which he extracts as much metal as serves to attract the glass he has made, to which he now fixes this rod at the bottom of his work, opposite to the opening made by the breaking of the collet. In this position, the glass is carried to the great bocca, or mouth of the oven, to be heated and scalded, by which means it is again put into such a soft state, that by the help of an iron instrument, it can be pierced, opened, and widened without breaking. But the vessel is not finished, till it is returned to the great bocca ; where it being again heated thoroughly, and turned quickly about with a circular motion, it will open to any size, by the means of the heat and motion. And by this means we come to learn the cause why the edge of all bowls and glasses, &c. are thicker than the other parts of the same glasses, because in the turning it about in the heat, the edge thickens ; and the glass being as it were doubled in that part, the circumference appears like a selvage.

If there remains any superfluities, they are cut off with the shears L ; for till the glass is cool, it remains in a soft, flexible state. It is therefore taken from the bocca, and carried to an earthen bench, covered with brands, which are coals extinguished, keeping it turning ; because that motion prevents any settling, and preserves an evenness in the face of the glass, where, as it cools, it comes to its consistency ; being first cleared from the iron rod by a slight stroke by the hand of the workman.

If the vessel conceived in the workman's mind, and whose body is already made, requires a foot, or a handle, or any other member or decoration, he makes them separate ; and now assays to join them with the help of hot metal, which he takes out of the pots with his iron rod : but the glass is not brought to its true hardness, till it has passed the leer, or annealing oven, described before.

*Working, or blowing, of window or table GLASS.* The method of working round glass, or vessels of any sort, is in every particular applicable to the working of window or table-glass, till the blowing iron has been dipt the fourth time. But then instead of rounding it, the workman blows, and so manages the metal upon the iron-plate, that it extends two or three feet in the form of a cylinder.

This

This cylinder is put again to the fire, and blown a second time, and is thus repeated till it is extended to the dimensions required, the side to which the pipe is fixed diminishing gradually till it ends in a pyramidal form; so that to bring both ends nearly to the same diameter, while the glass is thus flexible, he adds a little hot metal to the end opposite the pipe, and draws it out with a pair of iron pincers, and immediately cuts off the same end with the help of a little cold water, as before.

The cylinder being now open at one end is carried back to the bocca, and there, by the help of cold water, it is cut about eight or ten inches from the iron pipe, or rod; and the whole length at another place, by which also it is cut off from the iron rod. Then it is heated gradually on an earthen table, by which it opens in length, while the workman, with an iron tool, alternately lowers and raises the two halves of the cylinder, which at last will open like a sheet of paper, and fall into the same flat form in which it serves for use; in which it is preserved by heating it over again, cooling it on a table of copper, and hardening it twenty-four hours in the annealing furnace, to which it is carried upon forks. In this furnace, an hundred tables of glass may lie at a time, without injury to each other, by separating them into tens, with an iron shiver between, which diminishes the weight by dividing it, and keeps the tables flat and even.

This was the method formerly made use of for blowing plate-glass, looking-glasses, &c. but the workmen, by this method, could never exceed fifty inches in length, and a proportional breadth, because what were larger were always found to warp, which prevented them from reflecting the objects regularly, and wanted substance to bear the necessary grinding. These imperfections have been remedied by an invention of the Sieur Abraham Thevart, in France, about the year 1688, of casting or running large plates of glass in the following manner.

*Casting, or running of large looking-Glass plates.* The furnace G, (plate CXIV.) is of a very large dimension, environed with several ovens, or annealing furnaces, called carquasses, besides others for making of frit, and calcining old pieces of glass. This furnace, before it is fit to run glass, costs 3500*l*. It seldom

lasts above three years, and even in that time it must be refitted every six months. It takes six months to rebuild it; and three months to refit it. The melting-pots are as big as large hogheads, and contain about 2000 weight of metal. If one of them bursts in the furnace, the loss of the matter and time amounts to 250*l*. The heat of this furnace is so intense, that a bar of iron laid at the mouth thereof becomes red hot in less than half a minute. The materials in these pots are the same as described before; and A is the man breaking the frit for that purpose. When the furnace is red hot, these materials are put in at three different times, because that helps the fusion; and in twenty-four hours they are vitrified, refined, settled, and fit for casting. H is the bocca, or mouth of the furnace, K is the cistern that conveys the liquid glass it receives out of the melting-pots in the furnace to the casting table. These cisterns are filled in the furnace, and remain therein six hours after they are filled; and then are hooked out by the means of a large iron chain, guided by a pully marked I, and placed upon a carriage with four wheels marked L, by two men P, P. This carriage has no middle piece; so that when it has brought the cistern to the casting table M, they slip off the bottom of the cistern, and out rushes a torrent of flaming matter O, upon the table: this matter is confined to certain dimensions by the iron rulers N, N, N, which are moveable, retain the fluid matter, and determine the width of the glass; while a man R, with the roller Q resting on the edge of the iron rulers, reduceth it as it cools to an equal thickness, which is done in the space of a minute. This table is supported on a wooden frame, with trussles for the convenience of moving to the annealing furnace; into which, strewed with sand the new plate is shoved, where it will harden in about ten days. After this, the glass needs only be ground, polished, and foliated for use.

*Grinding and polishing of plate GLASS.* Glass is made transparent by fire, but it receives its lustre by the skill and labour of the grinder and polisher, the former of whom takes it rough out of the hands of the maker.

In order to grind plate-glass, they lay it horizontally upon a flat stone-table, (pl. CXV.) made of a very fine grained free-stone; and for its greater security they plaster

plaster it down with lime, or stucco : for otherwise the force of the workmen, or the motion of the wheel, with which they grind it, would move it about.

This stone-table is supported by a strong frame, A, made of wood, with a ledge quite round its edges, rising about two inches higher than the glass. Upon this glass to be ground, is laid another rough glass not above half so big, and so loose as to slide upon it; but cemented to a wooden plank, to guard it from the injury it must otherwise receive from the scraping of the wheel, to which this plank is fastened; and from the weights laid upon it, to promote the grinding, or friture, of the glasses. The whole is covered with a wheel, B, made of hard light wood, about six inches in diameter; by pulling of which backwards and forwards alternately, and sometimes turning it round, the workmen who always stand opposite to each other, produce a constant attrition between the two glasses, and bring them to what degree of smoothness they please, by first pouring in water and coarse sand : After that a finer sort of sand as the work advanceth, till at last they must pour in the powder of pumice. As the upper or incumbent glass polishes, and grows smoother, it must be taken away, and another from time to time put in its place.

This engine is called a mill by the artists, and is used only in the largest size glasses; for in the grinding of the lesser glasses, they are content to work without a wheel, and to have only four wooden handles fastened to the four corners of the stone which loads the upper plank, by which they work it about.

When the grinder has done his part, who finds it very difficult to bring the glass to an exact plainness, it is turned over to the care of the polisher, who with the fine powder of tripoli-stone, or emery, brings it to a perfect evenness and lustre. The instrument made use of in this branch, is a board, c, c, furnished with a felt, and a small roller, which the workman moves by means of a double handle at both ends. The artist in working this roller, is assisted with a wooden hoop, or spring, to the end of which it is fixed: for the spring, by constantly bringing the roller back to the same points, facilitates the action of the workman's arm.

*Grinding and polishing of optic GLASSES.*  
See GRINDING and POLISHING.

*Foliating of GLASS.* See FOLIATING.

*Axungia of GLASS.* See AXUNGIA.

*Painting in GLASS.* The antient manner of painting in glass was very simple and consequently very easy; it consisted in the mere arrangement of pieces of glass of different colours in some sort of symmetry, and constituted what is now called mosaic work. See MOSAIC.

In process of time they came to attempt more regular designs, and also to represent figures heightened with all their shades: yet they proceeded no farther than the contours of the figures in black with water-colours, and hatching the draperies after the same manner on glasses of the colour of the object they designed to paint. For the carnation, they used glass of a bright red colour; and upon this they drew the principal lineaments of the face, &c. with black.

But in time, the taste for this sort of painting improving considerably, and the art being found applicable to the adorning of churches, basilics, &c. they found out means of incorporating the colours in the glass itself, by heating them in the fire to a proper degree; having first laid on the colours. The colours used in painting or staining of glass are very different from those used in painting either in water or oil colours. See the article COLOUR.

For black, Take scales of iron, one ounce; scales of copper, one ounce; jet, half an ounce; reduce them to powder, and mix them. For blue, Take powder of blue, one pound; sal nitre, half a pound; mix them and grind them well together. For carnation, Take red chalk, eight ounces; iron scales and litharge of silver, of each two ounces; gum arabic, half an ounce; dissolve in water; grind all together for half an hour as stiff as you can; then put it in a glass and stir it well, and let it stand to settle fourteen days. For green, Take red lead, one pound; scales of copper, one pound; and flint, five pounds; divide them into three parts; and add to them as much sal nitre; put them into a crucible, and melt them with a strong fire; and when it is cold, powder it, and grind it on a porphyry. For gold colour, Take silver, an ounce; antimony, half an ounce; melt them in a crucible; then pound the mass to powder; and grind it on a copper plate; add to it yellow-oker, or brick-duit calcined again, fifteen ounces; and grind them

well together with water. For purple, Take minium, one pound ; brown stone, one pound ; white flint, five pounds ; divide them into three parts, and add to them as much sal nitre as one of these parts ; calcine, melt, and grind it as you did the green. For red, Take jet, four ounces ; litharge of silver, two ounces ; red chalk, one ounce ; powder them fine ; and mix them. For white, Take jet two parts ; white flint, ground on a glass very fine, one part ; mix them. For yellow, Take spanish brown, ten parts ; leaf silver, one part ; antimony, half a part ; put all into a crucible, and calcine them well.

In the windows of antient churches, &c. there are to be seen the most beautiful and vivid colours imaginable, which far exceed any of those used by the moderns, not so much because the secret of making those colours is intirely lost, as that the moderns will not go to the charge of them, nor be at the necessary pains, by reason that this sort of painting is not now so much in esteem as formerly. Those beautiful works which were made in the glass-houses were of two kinds.

In some, the colour was diffused through the whole substance of the glass. In others, which were the more common, the colour was only on one side, scarce penetrating within the substance above one third of a line ; though this was more or less according to the nature of the colour ; the yellow being always found to enter the deepest. These last, though not so strong and beautiful as the former, were of more advantage to the workmen, by reason that on the same glass, tho' already coloured, they could shew other kind of colours where there was occasion to embroider draperies, enrich them with foliages, or represent other ornaments of gold, silver, &c.

In order to this, they made use of emery, grinding or wearing down the surface of the glass, till such time as they were got through the colour to the clear glass. This done, they applied the proper colours on the other side of the glass. By this means, the new colours were hindered from running and mixing with the former, when they exposed the glasses to the fire, as will appear hereafter.

When indeed the ornaments were to appear white, the glass was only bared of its colour with emery, without tinging the place with any colour at all ; and this was the manner by which they

wrought their lights, and heightenings, on all kinds of colour.

The first thing to be done, in order to paint, or stain glass, in the modern way, is to design, and even colour the whole subject on paper. Then they choose such pieces of glass as are clear, even, and smooth, and proper to receive the several parts, and proceed to distribute the design itself, or papers it is drawn on, into pieces suitable to those of the glass ; always taking care that the glasses may join in the contours of the figures, and the folds of the draperies ; that the carnations, and other finer parts, may not be impaired by the lead with which the pieces are to be joined together. The distribution being made, they mark all the glasses as well as papers, that they may be known again : which done, applying every part of the design upon the glass intended for it, they copy, or transfer, the design upon this glass with the black colour diluted in gum water ; by tracing and following all the lines and strokes as they appear through the glass with the point of a pencil.

When these strokes are well dried, which will happen in about two days, the work being only in black and white, they give a slight wash over with urine, gum arabic, and a little black ; and repeat it several times, according as the shades are desired to be heightened, with this precaution, never to apply a new wash till the former is sufficiently dried.

This done, the lights and risings are given by rubbing-off the colour in the respective places with a wooden point, or the handle of the pencil.

As to the other colours above-mentioned, they are used with gum-water, much as in painting in miniature ; taking care to apply them lightly for fear of effacing the out-lines of the design ; or even, for the greater security, to apply them on the other side ; especially yellow, which is very pernicious to the other colours, by blending therewith. And here too, as in pieces of black and white, particular regard must always be had not to lay colour on colour, or lay on a new lay, till such time as the former are well dried.

It may be added, that the yellow is the only colour that penetrates through the glass, and incorporates therewith by the fire ; the rest, and particularly the blue, which is very difficult to use, remaining on the surface, or at least entering very

little. When the painting of all the pieces is finished, they are carried to the furnace, or oven, to anneal, or bake the colours.

The furnace here used is small, built of brick, from eighteen to thirty inches square; at six inches from the bottom is an aperture to put in the fuel, and maintain the fire. Over this aperture is a grate, made of three square bars of iron, which traverse the furnace, and divide it into two parts. Two inches above this partition, is another little aperture, through which they take out pieces to examine how the coction goes forward. On the grate is placed a square earthen pan, six or seven inches deep; and five or six inches less every way than the perimeter of the furnace. On the one side hereof is a little aperture, through which to make trials, placed directly opposite to that of the furnaces destined for the same end. In this pan are the pieces of glass to be placed, in the following manner. First, the bottom of the pan is covered with three strata, or layers, of quick lime pulverized; those strata being separated by two others of old broken glass, the design whereof is to secure the painted glass from the too intense heat of the fire. This done, the glasses are laid horizontally on the last or uppermost layer of lime.

The first row of glass they cover over with a layer of the same powder, an inch deep; and over this, they lay another range of glasses, and thus alternately till the pan is quite full; taking care that the whole heap always end with a layer of the lime-powder.

The pan being thus prepared, they cover up the furnace with tiles, on a square table of earthen ware, closely luted all round; only leaving five little apertures, one at each corner, and another in the middle, to serve as chimnies. Things thus disposed, there remains nothing but to give the fire to the work. The fire for the first two hours must be very moderate, and must be increased in proportion as the coction advances, for the space of ten or twelve hours; in which time it is usually completed. At last the fire, which at first was charcoal, is to be of dry wood, so that the flame covers the whole pan, and even issues out at the chimnies. During the last hours, they make essays, from time to time, by taking out pieces laid for the purpose through the little aperture of the furnace, and pan, to see whether the yellow be perfect, and the

other colours in good order. When the annealing is thought sufficient, they proceed with great haste to extinguish the fire, which otherwise would soon burn the colours, and break the glasses.

*GLASS of lead*, a glass made with the addition of a large quantity of lead; of great use in the art of making counterfeit gems. See the article *GEM*.

The method of making it is this. Put a large quantity of lead into a potter's kiln; and keep it in a state of fusion, with a moderate fire, till it is calcined to a very grey, loose powder: then spread it on the kiln, and give it a greater heat, continually stirring it, to keep it from gathering into lumps: continue this several hours, till the powder become of a fair yellow: then take it out, and sift it fine: this is called calcined lead. Take of this calcined lead fifteen pounds, and crytalline or other frit, twelve pounds; mix these as well as possible together; put them into a pot, and set them in the furnace for ten hours; then cast the whole, which will now be perfectly melted, into water; separate the loose lead from it; and return the metal into the pot; and after standing in fusion twelve hours more, it will be fit to work.

This glass is capable of all the colours of the gems in great perfection.

*GLASS porcelain*, the name given by many to a modern invention of imitating the china-ware with glass. See *PORCELAIN*. The method of making it, as given by Mr. Reamur, who was the first that carried the attempt to any degree of perfection, is as follows.

The glass vessels to be converted into porcelain, are to be put into large vessels, such as the common fine earthen dishes are baked in; or, into sufficiently large crucibles: the vessels are to be filled with a mixture of fine white sand, and of fine gypsum; or plaster-stone, burnt into what is called plaster of paris; and all the interstices are to be filled up with the same powder, so that the glass vessels may no where touch either one another, or the sides of the vessels they are baked in.

The vessel is to be then covered down, and luted, and the fire does the rest of the work: for this is only to be put into a common potter's furnace, and when it has stood there the usual time of baking the other vessels, it is to be taken out, and the whole contents will be found no longer glass, but converted

into a white opaque substance, which is a very elegant porcelain, and has almost the properties of that of china.

**GLASS** of *chalcedony*, a mixture of several ingredients with the common mixture of glass, which will make it represent the semi-opaque gems, the jaspers, agates, chalcedonies, &c. See **GEM**.

**GLASS** of *antimony* may be deprived of its emetic quality by digesting it with pure spirit of vinegar till the menstruum be highly tinged. See **ANTIMONY**.

Mr. Boyle says, that if you abstract this liquor, and digest good rectified spirit of wine on the remaining powder, an excellent tincture against several diseases may be obtained. See **TINCTURE**.

**Duties** on **GLASS**. Balm-glasses, on importation, pay per gross, 2s. 5 $\frac{98\frac{1}{2}}{100}$ d; and

draw back on exportation, 2s. 3 $\frac{84\frac{3}{8}}{100}$ d.

Burning-glasses, on importation, pay, per dozen, 11 $\frac{99\frac{1}{4}}{100}$ d. and draw back on

exportation, 11 $\frac{13\frac{3}{4}}{100}$ d. Perspective-glasses,

the piece not exceeding three feet in length, pay 8s. 1 $\frac{17\frac{5}{8}}{100}$ d. on importation; and draw back 7s. 4 $\frac{5\frac{5}{8}}{100}$ d. on exportation.

Perspective-glasses exceeding three feet in length, pay 16s. 2 $\frac{1\frac{5}{8}}{100}$ d. on importation; and draw back 14s. 9d. on exportation. Small perspective-glasses the dozen, pay on importation 8s. 1 $\frac{17\frac{5}{8}}{100}$ d.

and draw back on exportation, 7s. 4 $\frac{5\frac{5}{8}}{100}$ d. Vials the hundred, pay on importation,

4s. 11 $\frac{96\frac{1}{2}}{100}$ d. and draw back on exportation, 4s. 7 $\frac{68\frac{3}{4}}{100}$ d.

Water-glasses the dozen pay on importation, 3s. 11 $\frac{97\frac{5}{8}}{100}$ d.

and draw back on exportation, 3s. 8 $\frac{5\frac{5}{8}}{100}$ d. Broken glass the 112 lb. pays on importation, 1s. 1 $\frac{13\frac{3}{8}}{100}$ d.

and draw back on exportation, 1s. 6 $\frac{1}{100}$ d.

Coarse drinking-glasses, the dozen pay on importation

11 $\frac{99\frac{1}{4}}{100}$ d. and draw back on exportation,

11 $\frac{13\frac{3}{4}}{100}$ d. Flanders-drinking glasses per

hundred, pay on importation, 8s. 3 $\frac{93\frac{3}{4}}{100}$ d.

and draw back on exportation, 7s. 8 $\frac{81\frac{1}{4}}{100}$ d.

French drinking-glasses per hundred, pay on importation, 10s. 1 $\frac{83\frac{3}{4}}{100}$ d. and draw

back on exportation, 6s. 5 $\frac{56\frac{1}{4}}{100}$ d. Venice

drinking-glasses the dozen pay on importation, 5s. 11 $\frac{95\frac{1}{2}}{100}$ d.

and draw back on exportation, 5s. 6 $\frac{82\frac{1}{2}}{100}$ d. Flanders coarse

hour-glasses, the gross pay on importation, 19s. 11 $\frac{8\frac{5}{8}}{100}$ d.

and draw back on exportation, 18s. 6 $\frac{7\frac{1}{2}}{100}$ d. Flanders fine

hour-glasses pay per dozen, on importation, 6s. 7 $\frac{9\frac{5}{8}}{100}$ d.

and draw back on exportation, 6s. 2 $\frac{2\frac{5}{8}}{100}$ d. Venice hour-

glasses, the dozen, pay, on importation, 19s. 11 $\frac{8\frac{5}{8}}{100}$ d.

and draw back on exportation, 18s. 6 $\frac{7\frac{1}{2}}{100}$ d. Looking glasses of

crystal, small, n<sup>o</sup> 6. pay per dozen on importation, 9s. 11 $\frac{92\frac{1}{2}}{100}$ d.

and draw back on exportation, 9s. 3 $\frac{37\frac{1}{2}}{100}$ d. Middle

fort, the dozen pay on importation, 19s. 11 $\frac{8\frac{5}{8}}{100}$ d.

and draw back on exportation, 18s. 6 $\frac{7\frac{1}{2}}{100}$ d. Looking-glasses of crystal,

the dozen n<sup>o</sup> 11, 12. pay on importation, 14l. 19s. 9 $\frac{7\frac{5}{8}}{100}$ d.

and draw back on exportation, 13l. 18s. 5 $\frac{2\frac{5}{8}}{100}$ d.

**GLASTONBURY**, a market-town of Somersetshire, five miles south of Wells.

**GLASTONBURY-THORN**, in botany, a species of mephilus, or medlar.

**GLATZ**, the capital of a county of the same name in Bohemia, 100 miles east of Prague: east long. 16° 8', north lat. 50° 25'.

**GLAUBER'S SALT**, a cathartic or purging salt, thus made. Take of the cake

that remains after the distillation of Glauber's spirit of sea-salt; dissolve it in hot water, and filter the solution through paper. Then reduce the salt into crystals. It is given in doses, from half an ounce to an ounce. See **SALT**.

Glauber's salt, called by some sal mirabile, is nearly allied to Epsom salt. See **EPSOM**.

**GLAUCEO**, among physicians, the same with glaucoma. See **GLAUCOMA**.

**GLAUCION**, in ornithology, a very elegant fresh-water fowl, of the anas or duck-kind, nearly of the size of the common wild duck: its eyes are bright and very piercing in their aspect, and the iris of a fine gold-yellow. See **ANAS**.

**GLAUCIDIUM**, in zoology, the same with glaucus. See the article **GLAUCUS**.

**GLAUCIS SPECIES**, in botany, a name by which botanists call two distinct plants, the *isnardia* and *peplis*. See the articles *ISNARDIA* and *PEPLIS*.

**GLAUCIUM**, in botany, the same with *chelidonium*, or *celandine*. See the article *CHELIDONIUM*.

**GLAUCODES**, a name used by some for two distinct plants, the *glaux* and *peplis*.

**GLAUCOMA**, in medicine, the change of the crystalline humour of the eye into an azure-colour, proceeding from its dryness and condensation, as some affirm; but Heister rather thinks, it arises from an opacity of the vitreous humour, which becomes of a whitish-green colour: for in a suffusion, an opaque body is placed behind the pupil, or is next to the uveous part. Sennertus says, it may be known from a very remarkable whiteness appearing in the eye, and lying deep behind the pupil; which makes every thing appear as if seen through a smoky cloud. It is said to be incurable when inveterate; but that the medicines prescribed for a *gutta serena*, are best also in this case. See the article *GUTTA SERENA*.

**GLAUCUS**, in ichthyology, the name of two distinct fishes, the one a species of *scomber*, with the second ray of the hinder back-fin longest; and the other a species of *squalus*, with a triangular cavity in the hinder part of the back, but without any foramina beside the eyes. This last is the blue shark.

**GLAUX**, in botany, a genus of the *pentandria-monogynia* class of plants, the flower of which consists of a single, campanulated, erect, and permanent petal, divided into five roundish segments: the fruit is a large, globose, but acuminate and unilocular capsule, formed of five valves, and containing five roundish seeds.

**GLAUX** is also the name by which some call the *astragalus*, or milk-vetch. See the article *ASTRAGALUS*.

**GLAZIER**, an artificer who works in glass. See the article *GLASS*.

The principal part of a glazier's business consists in fitting panes and plates of glass to the sashes and window-frames of houses, pictures, &c. and in cleaning the same.

**GLAZING**, the polishing or crusting over earthen-ware, by running melted lead or litharge over it.

The common ware is glazed with a composition of 50 lb. clean sand, 70 lb. lead-ashes, 30 lb. wood-ashes, and 12 lb. salt,

all melted into a cake. With this mixture they glaze it over, and then set it in an earthen glazing pan; taking care that the vessels do not touch one another. As several colours are used for this purpose, we shall give the following receipts, from Smith's Laboratory. 1. For a black, take lead-ashes, 18 parts; iron-filings, 3; copper-ashes, 3; and zaffer, 2: this, when melted, will make a brown black; and if you would have it blacker, put some more zaffer to it. 2. For blue, take lead-ashes, 1 lb. clear sand or pebble, 2 lb. salt, 2 lb. white calcined tartar, 1 lb. Venice or other glass, 16 lb. and zaffer, half a pound: mix them well together; and after melting quench them in water, and then melt them again; which operation is to be repeated several times; and if you would have it fine and good, it will be proper to put the mixture into a glass furnace for a day or two. 3. A brown glazing may be given with a mixture of lead-glass, 12 parts, and common glass and manganese, of each one part. 4. A citron-yellow may be made of 6 parts of red-lead, 7 parts of fine red brick-duft, and 2 parts of antimony, all melted together. 5. A flesh-colour, with 12 parts of lead-ashes, and 1 of white glass. 6. For a green-colour, take 8 parts of litharge, 8 parts of Venice glass, 4 parts of brass duft, and melt them together for use; or melt together 2 parts yellow-glass, with as much copper-duft. 7. For a gold-yellow, take of antimony, red-lead, and sand, an equal quantity, and melt them into a cake. 8. For a fine purple-brown, take lead-ashes, 15 parts; clear sand, 18; manganese, 1; white glass, 15 measures; and 1 of zaffer. 9. For a fine red, take antimony, 2 lb. litharge, 3 lb. ruft of iron calcined, 1 lb. and grind them to a fine powder. 10. For a fine white glazing, take 2 lb. of lead, 1 lb. of tin, and calcine them to ashes; of which take 2 parts; of calcined flint or pebble, 1 part; of salt, 1 part; and mixing them well together, melt them into a cake. At Rotterdam, they make a fine shining white glazing, by melting together 2 lb. clean tin-ashes, 10 lb. lead-ashes, 2 lb. fine Venice-glass, and  $\frac{1}{2}$  lb. tartar. 11. A yellow glazing is made of 4 ounces of red-lead, and 2 ounces of antimony, melted together. 12. For a fine yellow, take red-lead, 3 pints; antimony and tin, of each 2 lb. then melting them into a cake, grind it fine; and repeating this

several times, you will have a good yellow.

**GLEAD**, or **GLADE**, in ornithology, a name used in some parts of the kingdom for the milvus, or kite. See **MILVUS**.

**GLEAM**, among falconers, is said of a hawk, when she casts or throws up filth from her gorge.

**GLEBE**, among miners, signifies a piece of earth, wherein is contained some mineral ore. See the article **ORE**.

**GLEBE**, in law, the land belonging to a parish church, besides the tithes.

When a parson or vicar has caused any of his glebe-lands to be manured and sown, at his own charge, with corn or grain, he may by will devise all the profits and corn growing upon the said glebe; and in case he dies without disposing thereof, his executors shall have the same.

**GLECHOMA**, in botany, the name by which Linnæus calls ground-ivy, a plant belonging to the *didynamia-gymnospermia* class, the flower of which is monopetalous and ringent: there is no pericarpium; the seeds, which are oval and four in number, being contained in the cup. The flowers are moderately large, and of a beautiful blue. See **GROUND-IVY**.

**GLEDE**, or **GLEAD**. See **GLEAD**.

**GLEDITSIA**, in botany, a genus of the *dioccia-hexandria* class of plants, the flower of which consists of four petals, and is arranged in the form of an amen-tum: the fruit is a very large pod, separated by partitions into distinct cells, which are full of a pulpy matter: the seeds are solitary, roundish, hard and shining.

**GLEET**, in medicine, the flux of a thin limpid humour from the urethra.

Many imagine that the prodigious increase of certain gleet at particular times, lasting only for two or three days, and then suddenly abating to their wonted quantity, is inconsistent with a purulent discharge; and, therefore, conclude a gleet to be nothing but a præternatural excretion from the relaxed vessels of the urethra. For the cure of venereal gleet, the use of a bougie is recommended, as are astringent injections, beginning with weak ones, and gradually increasing their strength. Aitken recommends milk, drank morning and evening for some time; then mineral waters, whether chalybeate or vitric, for fifteen or twenty days; and afterwards balsamics, to deterge and cicatrize the ulcers concealed

in the urethra; and, last of all, astringents, to dry up the ulcers, and recover the tone of the parts; such as infusions of the leaves of mint, horehound, agrimony, plantain, shepherd's purse, sage, &c. Turner recommends the cold bath, Spaw, Pyrmont, and Bristol waters. Heister, for an injection, recommends lime-water, with a little sugar of lead, or lime-water, with a little camphorated spirit of wine. Turner, when there is any suspicion of a remaining virulence, adds calomel to the lime-water.

**GLENE**, γληνη, in anatomy, a shallow cavity of any bone, which receives another bone in articulation. It also signifies the cavity or socket of the eye.

**GLENOIDES**, the name of two cavities, or small depressions, in the inferior part of the first vertebra of the neck.

**GLSUM**, a name antiently given to amber. See the article **AMBER**.

**GLIS**, in zoology, a name given by some to the common rat, as also to the rell and dor-mouse. See **MUS** and **RAT**.

The flesh of the rell-mouse is recommended for a bulimy; and its fat, rubbed on the feet, is said to procure sleep.

**GLISCHROMICTHES**, in natural history, the name by which Dr. Hill calls the tougher and more viscid loams. See the article **LOAM**.

Of this genus there are several species.

1. The greyish-white glischromictes, of a dense and compact texture: this raises a great effervescence with aqua-fortis, and makes a very valuable brick; but requires too much working, that it is seldom used alone. 2. The pale yellow glischromictes: this raises no effervescence with aqua-fortis, but makes a fine red brick. 3. The yellowish-brown glischromictes, which raises no effervescence with aqua-fortis, and makes a very good brick, but is seldom used alone. 4. The reddish-brown glischromictes. It raises no effervescence with aqua-fortis, and tho' used in brick-making, makes but a soft and coarse kind.

**GLISSA**, a fish of the tunny-kind, of a very delicate taste. See **THYNNUS**.

**GLISTER**, in surgery, the same with clyster. See the article **CLYSTER**.

**GLOBE**, in geometry, the same with sphere. See the article **SPHERE**.

**GLOBE**, in practical mathematics, an artificial spherical body, on the convex surface of which are represented the countries, seas, &c. of our earth; or the face of the heavens, the circles of the sphere, &c.



*&c.* That with the parts of the earth delineated upon its surface, is called the terrestrial globe; and that with the constellations, *&c.* the celestial globe. These globes are placed in frames, with other appurtenances, as represented in plate CXVI. fig. 1. and 2. Their principal use, besides serving as maps to distinguish the outward parts of the earth, and the situation of the fixed stars, is to illustrate and explain the phenomena arising from the diurnal motion of the earth. See the article DIURNAL.

*Construction and description of the GLOBES.*

The globes commonly used are made of pasteboard, or paper, fitted to a spherical mold. After this covering is formed to the artificer's mind, it is divided, by incision, along the middle, and taken off the mold in the form of two caps, or hemispheres. These are next fitted upon a wooden axis, with iron-poles; and, being firmly sewed together, are afterwards pasted over with a composition made of whiting and glue, till the globe become perfectly spherical and smooth. This done, a map of the earth, or of the heavens, is projected in several gores, which being pasted on, the whole is coloured and varnished. Thus finished, the globe is hung in a brazen meridian, moveable within a wooden horizon, and fitted with a horary circle, quadrant of altitude, *&c.*

There are ten principal circles represented upon globes, *viz.* six greater and four lesser ones. The greater circles are the horizon, meridian, equinoctial, as it is called on the celestial, and equator on the terrestrial globe, the ecliptic drawn along the middle of the zodiac, and the two colures. See the articles HORIZON, MERIDIAN, *&c.*

The lesser circles, of principal use, are the two tropics and two polar circles. See CIRCLE, TROPIC, and POLAR.

Of these circles some are fixed, and always obtain the same position; others moveable, according to the position of the observer. The fixed circles are the equator and ecliptic, with their parallels and secondaries; which are usually delineated upon the surface of the globes. The moveable circles are the horizon, with its parallels and secondaries.

The horizon is that great and broad wooden circle surrounding the globe, and dividing it into two equal parts, called the upper and lower hemispheres. It has two notches, to let the brazen meridian

slip up and down, according to the different heights of the pole. On the flat side of this circle are described the twelve signs, the months of the year, the points of the compass, *&c.* The brazen meridian is an annulus or ring of brass, divided into degrees, as represented in the figure. It divides the globe into two equal parts, called the eastern and western hemispheres. The quadrant of altitude is a thin pliable plate of brass, answering exactly to a quadrant of the meridian. It is divided into 90°, and has a notch, nut and screw, to fix to the brazen meridian in the zenith of any place; where it turns round a pivot, and supplies the room of vertical circles. The hour-circle is a flat ring of brass, divided into twenty-four equal parts, or hour-distances; and on the pole of the globe is fixed an index, that turns round with the globe, and points out the hours upon the hour-circle. Lastly, there is generally added a compass and needle upon the pediment of the frame.

The surface of the celestial globe may be esteemed a just representation of the concave expanse of the heavens, notwithstanding its convexity; for it is easy to conceive the eye placed in the center of the globe, and viewing the stars on its surface; supposing it made of glass, as some globes are: also that if holes were made in the center of each star, the eye in the center of the globe, properly placed, would view thro' each of the holes the very stars in the heavens represented by them.

As it would be impossible to have any distinct notion of the stars, in respect of their number, order, and distances, without arranging them in certain forms, called constellations, this the first observers of the heavens took care to do; and these, like kingdoms and countries upon the terrestrial globe, serve to distinguish the different parts of the superficies of the celestial globe. See CONSTELLATION.

The stars, therefore, are all disposed in constellations under the forms of various animals, whose names and figures are represented on the celestial globe; which were first invented by the ancient astronomers and poets, and are still retained for the better distinction of these luminaries.

*Problems on the celestial GLOBE. 1. To rectify the globe.* Raise or elevate the pole to the latitude of the place; screw the quadrant of altitude in the zenith; set the

the index of the hour-circle to the upper XII; and place the globe north and south by the compass and needle; then is it a just representation of the heavens from the given day at noon. 2. *To find the sun's place in the ecliptic.* Find the day of the month in the calendar on the horizon, and right against it is the degree of the ecliptic which the sun is in for that day. 3. *To find the sun's declination.* Rectify the globe, bring the sun's place in the ecliptic to the meridian, and that degree which it cuts in the meridian is the declination required. 4. *To find the sun's right ascension.* Bring the sun's place to the meridian, and the degree of the equinoctial cut by the meridian, is the right ascension required. 5. *To find the sun's amplitude.* Bring the sun's place to the horizon, and the arch of the horizon intercepted between it and the east or west point, is the amplitude, north or south. 6. *To find the sun's altitude for any given day and hour.* Bring the sun's place to the meridian; set the hour-index to the upper XII; then turn the globe till the index points to the given hour, where let it stand; then screwing the quadrant of altitude in the zenith, lay it over the sun's place, and the arch contained between it and the horizon, will give the degrees of altitude required. 7. *To find the sun's azimuth for any hour of the day.* Every thing being done as in the last problem, the arch of the horizon contained between the north point, and that where the quadrant of altitude cuts it, is the azimuth east or west, as required. 8. *To find the time when the sun rises or sets.* Find the sun's place for the given day; bring it to the meridian, and set the hour-hand to XII; then turn the globe till the sun's place touches the east part of the horizon, the index will shew the hour of its rising: after that, turn the globe to the west part of the horizon, and the index will shew the time of its setting for the given day. 9. *To find the length of any given day or night.* This is easily known, by taking the number of hours between the rising and setting of the sun for the length of the day; and the residue, to 24, for the length of the night. 10. *To find the hour of the day, having the sun's altitude given.* Bring the sun's place to the meridian, and set the hour-hand to XII; then turn the globe in such a manner, that the sun's place may move along by the quadrant of altitude (fixed in the zenith) till it

touches the degree of the given altitude; where stop it, and the index will shew on the horary circle the hour required. 11. *To find the place of the moon, or any planet, for any given day.* Take Parker's or Weaver's ephemeris, and against the given day of the month you will find the degree and minute of the sign which the moon or planet possesses at noon, under the title of geocentric motions. The degree thus found being marked in the ecliptic on the globe by a small notch, or otherwise, you may then proceed to find the declination, right ascension, latitude, longitude, altitude, azimuth, rising, southing, setting, &c. in the same manner as has been shewn for the sun. 12. *To explain the phenomena of the harvest moon.* In order to this we need only consider, that when the sun is in the beginning of aries, the full moon on that day must be in the beginning of libra: and since when the sun sets, or moon rises, on that day, those equinoctial points will be in the horizon, and the ecliptic will then be least of all inclined thereto, the part or arch which the moon describes in one day, viz.  $13^{\circ}$ , will take up about an hour and a quarter ascending above the horizon; and, therefore, so long will be the time after sun-set, the next night, before the moon will rise. But at the opposite time of the year, when the sun is in the autumnal, and the full moon in the vernal equinox, the ecliptic will, when the sun is setting, have the greatest inclination to the horizon; and, therefore,  $13^{\circ}$  will in this case soon ascend, viz. in about a quarter of an hour; and so long after sun-set will the moon rise the next day after the full: whence, at this time of the year, there is much more moon-light than in the spring; and hence this autumnal full moon came to be called the harvest moon, the hunter's or shepherd's moon: all which will be clearly shewn on the globe. 13. *To represent the face of the starry firmament for any given hour of the night.* Rectify the globe, and turn it about, till the index points to the given hour; then will all the upper hemisphere of the globe represent the visible half of the heavens, and all the stars on the globe will be in such situations as exactly correspond to those in the heavens; which may therefore be easily found, as will be shewn in the sixteenth problem. 14. *To find the hour when any known star will rise, or come upon the meridian.* Rectify the globe,

globe, and set the index to XII; then turn the globe till the star comes to the horizon or meridian, and the index will shew the hour required. 15. *To find at what time of the year any given star will be on the meridian at XII at night.* Bring the star to the meridian, and observe what degree of the ecliptic is on the north meridian under the horizon; then find in the calendar on the horizon the day of the year against that degree, and it will be the day required. 16. *To find any particular star.* First find its altitude in the heavens by a quadrant, and the point of the compass it bears on; then, the globe being rectified, and the index turned to the given hour, if the quadrant of altitude be fixed on the zenith, and laid towards the point of the compass on which the star was observed, the star required will be found at the same degree of altitude on the said quadrant, as it was by observation in the heavens.

**Problems on the terrestrial GLOBE.** 1. *To find the latitude of any place.* Bring the given place to the brazen meridian, and observe what degree it is under, for that is the latitude required. 2. *To rectify the globe for any given place.* Raise the pole so many degrees above the horizon, as are equal to the latitude of the place; then, finding the sun's place, bring it to the meridian; and proceed, as directed in problem 1. on the celestial globe. 3. *To find the longitude of a given place.* Bring the place to the brazen meridian, and observe the degree of the equator under the same, for that expresses the longitude required. 4. *To find any place by the latitude and longitude given.* Bring the given degree of longitude to the meridian, and under the given degree of latitude you will see the place required. 5. *To find all those places which have the same latitude, or longitude, with those of any given place.* Bring the given place to the meridian, then all those places which lie under the meridian have the same longitude: again, turn the globe round on its axis; then all those places, which pass under the same degree of the meridian with any given place, have the same latitude with it. 6. *To find all those places where it is noon at any given hour of the day, in any place.* Bring the given place to the meridian; set the index to the given hour; then turn the globe, till the said index points to the upper XII; and observe what places lie under the brass meridian, for to them it is noon

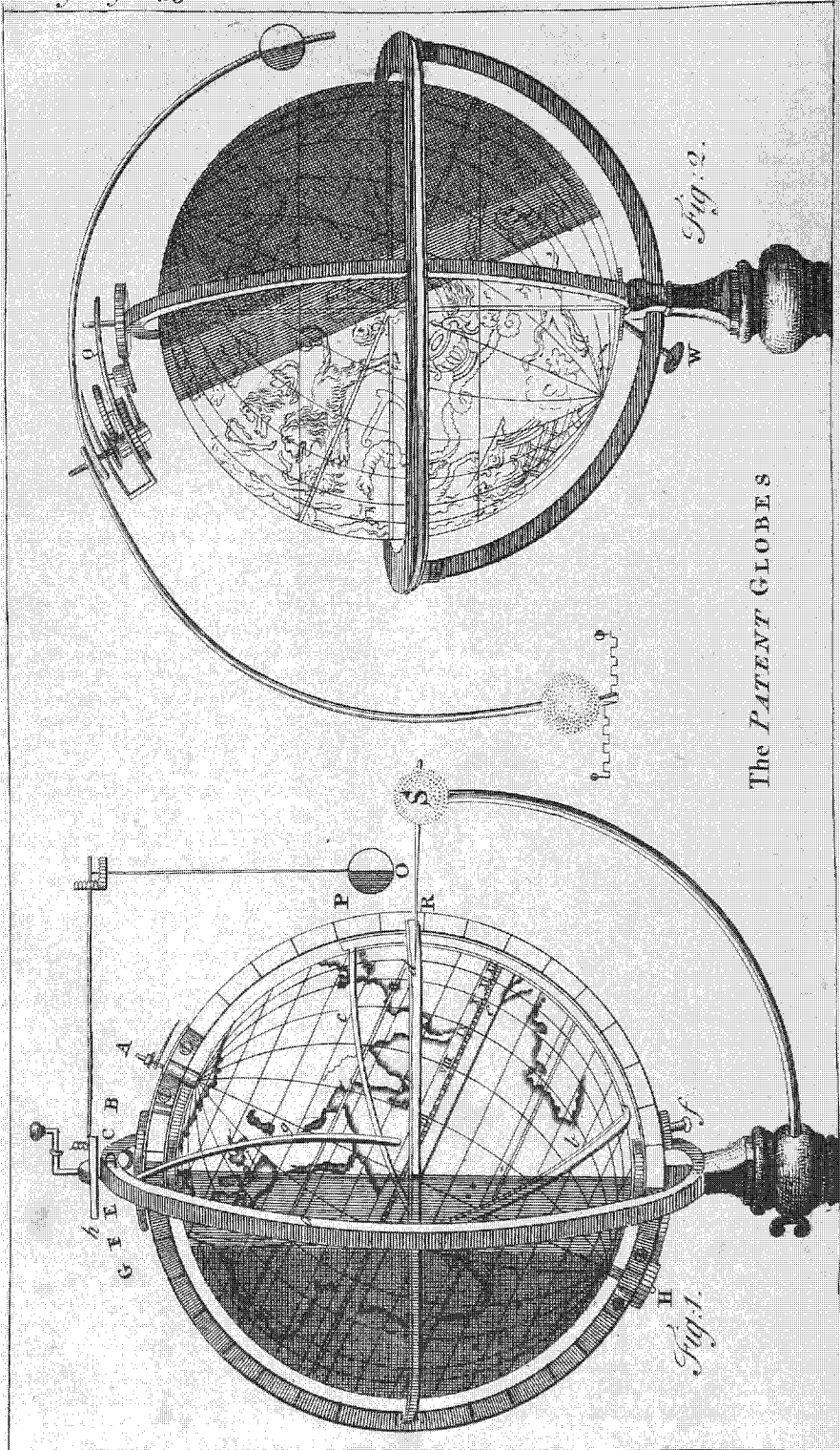
at that time. 7. *When it is noon at any one place, to find what hour it is at any other given place.* Bring the first given place to the meridian, and set the index to the upper XII; then turn the globe till the other given place comes to the meridian, and the index will point to the hour required. 8. *For any given hour of the day in the place where you are, to find the hour of the day in any other place.* Bring the place where you are to the meridian, set the index to the given hour, then turn the globe about, and when the other place comes to the meridian, the index will shew the hour of the day there, as required. 9. *To find the distance between any two places on the globe in english miles.* Bring one place to the meridian, over which fix the quadrant of altitude; and then laying it over the other place, count the number of degrees thereon contained between them; which number multiply by  $69\frac{1}{2}$ , (the number of miles in one degree,) and the product is the number of english miles required. 10. *To find how any one place bears from another.* Bring one place to the brass meridian, and lay the quadrant of altitude over the other; and it will shew on the horizon the point of the compass on which the latter bears from the former. 11. *To find those places to which the sun is vertical in the torrid zone, for any given day.* Find the sun's place in the ecliptic for the given time, and bring it to the meridian, and observe what degree thereof it cuts; then turn the globe about, and all those places which pass under that degree of the meridian, are those required. 12. *To find what day of the year the sun will be vertical to any given place in the torrid zone.* Bring the given place to the meridian, and mark the degree exactly over it; then turn the globe round, and observe the two points of the ecliptic which pass under that degree of the meridian: lastly, see on the wooden horizon on what days of the year the sun is in those points of the ecliptic; for those are the days required. 13. *To find those places in the north frigid zone, where the sun begins to shine constantly without setting, on any given day between the 21st of March and the 21st of June.* Find the sun's place in the ecliptic for the given day; bring it to the general meridian, and observe the degrees of declination; then all those places which are the same number of degrees distant from the pole, are the places required to

be found. 14. *To find on what day the sun begins to shine constantly without setting, on any given place in the north frigid zone, and how long.* Rectify the globe to the latitude of the place; and, turning it about, observe what point of the ecliptic between aries and cancer, and also between cancer and libra, coincides with the north point of the horizon; then find, by the calendar on the horizon, what days the sun will enter those degrees of the ecliptic, and they will satisfy the problem. 15. *To find the place over which the sun is vertical, on any given day and hour.* Find the sun's place, and bring it to the meridian, and mark the degree of declination for the given hour; then find those places which have the sun in the meridian at that moment; and among them, that which passes under the degree of declination, is the place desired. 16. *To find, for any given day and hour, those places wherein the sun is then rising and setting, or on the meridian; also those places which are enlightened, and those which are not.* Find the place to which the sun is vertical at the given time, and bring the same to the meridian, and elevate the pole to the latitude of the place; then all those places which are in the western semicircle of the horizon have the sun rising, and those in the eastern semicircle see it setting; and to those under the meridian, it is noon. Lastly, all places above the horizon are enlightened, and all below it are in darkness or night. 17. *The day and hour of a solar or lunar eclipse being given, to find all those places in which the same will be visible.* Find the place to which the sun is vertical at the given instant, and elevate the globe to the latitude of the place; then in most of those places above the horizon will the sun be visible during his eclipse; and all those places below the horizon, will see the moon pass through the shadow of the earth in her eclipse. 18. *The length of a degree being given, to find the number of miles in a great circle of the earth, and thence the diameter of the earth.* Admit that one degree contains  $69\frac{1}{2}$  english statute miles; then multiply 360 (the number of degrees in a great circle) by  $69\frac{1}{2}$ , and the product will be 25020, the miles which measure the circumference of the earth. If this number be divided by 3.1416, the quotient will be 7963 $\frac{86}{100}$  miles, for the diameter of the earth. 19. *The diameter of the earth being known,*

*to find the surface in square miles, and its solidity in cubic miles.* Admit the diameter be 7964 miles; then multiply the square of the diameter by 3.1416, and the product will be 199250205 very near, which are the square miles in the surface of the earth. Again, multiply the cube of the diameter by 0.5236, and the product 264466789170 will be the number of the cubic miles in the whole globe of the earth. 20. *To express the velocity of the diurnal motion of the earth.* Since a place in the equator describes a circle of 25020 miles in twenty-four hours, it is evident that the velocity with which it moves is at the rate of  $1042\frac{1}{2}$  in one hour, or  $17\frac{3}{10}$  miles per minute. The velocity in any parallel of latitude, decreases in the proportion of the co-sine of the latitude to the radius. Thus for the latitude of London,  $51^{\circ} 30'$ , say,  
As radius 10.000000  
To the co-sine of lat.  $51^{\circ} 30'$  9.794149  
So is the velocity in the } 2.232046  
equator,  $17\frac{3}{10}$  }  
To the velocity of the city } 2.032195  
of London,  $10\frac{8}{10}$  }  
That is, the city of London moves about the axis of the earth at the rate of  $10\frac{8}{10}$  miles every minute of time. But this is far short of the velocity of the annual motion about the sun; for that is at the rate of 60000 miles per hour, or about 1000 miles each minute, supposing the diameter of the annual orbit to be 82 millions of miles.

**Patent-GLOBES**, those with Mr. Neale's improvements, for which he obtained his majesty's letters-patent. The terrestrial globe, with the improvements of this ingenious artist, is represented in plate CXVII. fig. 1. the earth being supposed in that part of its orbit where the north pole A is at its nearest approach to the sun S, which accordingly by the index or ray SR, points to the tropic of cancer; *b* is a moveable circle, which, set to the latitude of a given place, will cause the semicircle *c* to point out the zenith of the said place; *d* represents the ecliptic, *e* the equator, and *f* a screw by which the annual motion may be separated from the diurnal; *g* is a semicircle which always moves at  $90^{\circ}$  distance from the moon, and thereby becomes the lunar horizon for the northern hemisphere; *b* is an inclined plane on which the stem of the moon PO moves, thereby causing the moon itself to shew its several latitudes, nodes, &c. and by this plane





The PATENT GLOBES

plane moving the contrary way, in a little more than 19 of the annual revolutions of the globe, is shewn the retrograde motion of the nodes.

This globe is mounted with the horizon *a* fixed vertically, and placed so as to move upon its own axis *AH*, whereby it represents the diurnal motion of the earth. Hence if the globe be turned round its own axis, by means of the winch at top, the ray from the sun will, in this situation, describe the tropic of cancer: the whole arctic circle will be taken into the enlightened hemisphere, and that of the antarctic circle will be involved in darkness. Let us now suppose the globe turned thirty times about by the winch, the north pole will then be situated as at *B*, and the index from the sun will point to the sign leo on the ecliptic *d*: after turning the globe thirty times more, the north pole will be removed to *C*, and the index advanced to virgo; and in this manner may the phenomena of the earth's annual motion be traced through all the signs of the ecliptic and seasons of the year; the index or pointer describing a spiral line, which every day at noon, or turn of the globe, falls at the distance of about fifteen minutes from that of the preceding day. When the earth is so far advanced in its orbit, that the index *SR* points to the equator, the reason will appear very clear why the days and nights are then equal all the world over; for both poles are now seen in the horizon, which, being the boundary of light and darkness, bisects all the parallels of latitude, and causes an equal distribution of day and night throughout the whole earth.

If the rotation of the globe be continued, the observer will see the north pole descend just as many degrees below the horizon, as the pointer has advanced south of the equator; and when it is arrived at the tropic of capricorn, all that part of the globe within the arctic circle will be involved in continual darkness, whilst that within the antarctic circle enjoys uninterrupted day.

At the distance of 90° from the moon, as has been already observed, is placed a semicircle, which being fixed on the center of the moon's motion, always moves round with her; thereby shewing, throughout her course, all those countries in the northern hemisphere to which she is at any particular time rising, those where she is then setting, and those to

whom she is then due south; as also the exact difference of time between the rising or setting of the sun and moon.

The celestial globe (*ibid.* fig. 2.) is mounted not quite so differently from the common globes, as the terrestrial one; its horizon being as usual, and the globe moveable to the latitude of any country; only instead of those upright pillars to support the horizon, as in common ones, here semicircles are fixed on the pedestal, and from the pole of the equator a motion is conveyed to the pole of the ecliptic; where two arms or indices are placed, on which are fixed the artificial sun and moon. These, as the globe is turned about its axis by the winch *W*, keep their exact motions over the same, by means of the wheel-work at *Q*, in like manner as those luminaries do in the heavens; so that being once set right by an ephemeris, they will remain so, and thereby shew the rising and setting of these luminaries, with the length of the day and night, together with the true cause of all the vicissitudes of the seasons; and how, notwithstanding their apparent motion from east to west, they really move from west to east; the moon, in a very little more than twenty-nine days and a half; and the sun, in a year. See EARTH, SUN, and MOON.

To the center of the sun two jointed stems are occasionally screwed on, and to these are fixed mercury and venus; which by the said joints may be set to their proper stations, and thereby several entertaining problems may be solved. From what has been said it is evident, that the usual problems on the common globes, and most of those with the orrery, may be solved by these curious machines.

*Problems peculiar to the patent-GLOBES.*

1. *To rectify these globes.* This, on the celestial globe, is performed in the same manner as on the common globes. But the terrestrial globe admits of no such rectification; for instead of raising or lowering the pole of the globe itself, according to the latitude of the place, we must here rectify a moveable brass-horizon, so as that the given place shall be in the zenith of the said horizon. 2. *To rectify the sun or moon, according to these globes.* Having found the sun's place in the ecliptic, in the common way, turn the sun about by its stem till it is directly opposite to the same sign and degree of the ecliptic upon the globe. The same

may also be done with respect to the moon, having first found her place by an ephemeris for that day. 3. *To shew on these globes the cause of an eclipse of the sun or moon.* This is self-evident on either globe, by turning them by the winch till the two luminaries come in conjunction with, or opposition to each other, provided they happen to be in or near the nodes. 4. *To explain the reason why they happen no oftener.* This will appear no less evident, by setting the moon to any considerable latitude, and turning the globe till she comes in conjunction with the sun; for then the pointer from the sun will be seen to pass either above or below her, according as she is in north or south latitude; so that there can be no eclipse of the sun, when the moon is not in or near her nodes. 5. *To exhibit a natural representation of the retrograde motion of the moon's nodes.* This is done by only turning the globe with the winch, and observing that the place where the moon crosses the ecliptic, in its motion round the earth, is every time in different places; which are found to be retrograde, or contrary to the order of the signs; that is, they move backward through all the signs from east to west. 6. *The day and hour of a solar eclipse being given, to find all those places on the globe to which the same will be visible.* Turn the globe till the given day comes opposite to the sun, and the place where you are to the pointer; set the index to 12, then turn the globe till the index points to the given hour; set the moon in conjunction with the sun: then all the places above the solar horizon are those to which the eclipse will be visible. 7. *To find the same in a lunar eclipse.* Proceed as in the last problem; only instead of the moon's being in conjunction, she must now be in opposition; and instead of viewing all the countries on that side of the horizon towards the sun, you must survey those on the opposite side; for they are the countries to which the lunar eclipse will be visible. 8. *To exhibit the phases of mercury and venus.* Set them to any given station within the enlightened hemisphere of the celestial globe; and it may be observed, that their different phases in those several stations will be in all respects analogous to those of our moon. 9. *To demonstrate, that in a certain latitude, the inhabitants may observe the sun, moon, mercury, and venus all rising together on a particular day; and yet, on the*

*same day, may see the moon set twelve hours before the sun, mercury fourteen hours after the moon, and venus six hours after all three.* Rectify the globe to the latitude of  $66\frac{1}{2}$ ; let the moon rise near the tropic of capricorn, the sun at the beginning of aries, mercury about fifteen degrees in aries, and venus about eighteen degrees in taurus, with five or six degrees of north latitude; then turn the globe about, and you will find by the index the difference of time sought for. 10. *To find the height of the diurnal arch of the luminaries and planets aforesaid, on any given day.* The globe being rectified, screw the quadrant of altitude to the zenith of the place, which bring to the meridian; then turn about the globe to the given day, and the degree of the quadrant, each respectively pass over, is the height of their arches sought. 10. *To shew why neither mercury nor venus can be seen on the meridian of London at midnight, as all the other planets at certain times are.* Set these two planets to their greatest elongation or distance from the sun; and, by turning the globe about, the impossibility of the thing will be evident.

**GLOBULAR**, in general, an appellation given to things of a roundish figure, like that of a globe.

**GLOBULAR CHART**, a name given to the representation of the surface, or of some part of the surface of the terrestrial globe upon a plane, wherein the parallels of latitude are circles nearly concentric, the meridians curves bending towards the poles, and the rhumb-lines are also curves. See the article **CHART**.

**GLOBULARIA**, in botany, a genus of plants of the *tetrandria-monogynia* class, the proper flower of which is formed of a single petal, tubular at the base, and divided into five segments at the limb; the universal corolla is nearly equal; there is no pericarpium, but the proper perianthium closes at its top, and contains the seed, which is single, and of an oval figure.

Of this genus there are several species, among which that called by some the *alypum* of Montpellier, is a violent cathartic and emetic, and is sometimes given in dropshes with success; but it ought to be used with great caution: its bark contains its principal virtues.

**GLOBULE**, a diminutive of globe, frequently used by physicians in speaking of the red spherical particles of the blood. See the article **BLOOD**.



**GLOCESTER**, the capital of Gloucestershire, ninety miles west of London: west lon.  $2^{\circ} 16'$ , and north lat.  $51^{\circ} 50'$ . It is a bishop's see, and sends two members to parliament.

**GLOGAW**, a city of Silesia, situated on the river Oder, forty-five miles north-west of Breslaw: east lon.  $16^{\circ} 8'$ , and north lat.  $51^{\circ} 40'$ .

*Lesser* **GLOGAW**, a town of Silesia, fifty miles south of Breslaw.

**GLORIA PATRI**, among ecclesiastical writers. See **DOXOLOGY**.

**GLORIOSA**, **SUPERB LILLY**, in botany, a genus of the *hexandria-monogynia* class of plants, the flower of which consists of six oblongo-lanceolated, undulated, and very long petals, reflex nearly to the base; the fruit is an oval pellucid capsule, containing three cells, and numerous globose seeds, disposed in a double series.

**GLOSS**, in matters of literature; denotes an exposition or explication of the text of any author, whether in the same language, or any other; in which sense it differs little from commentary. See the article **COMMENTARY**.

**GLOSS**, among artificers, the lustre or brightness set upon cloth, silk, and the like. See the articles **CLOTH**, **SILK**, &c.

**GLOSSARY**, *glossarium*, a sort of dictionary, explaining the obscure and antiquated terms in some old author; such are Du Cange's latin and greek glossaries, Spelman's Glossary, and Kennet's Glossary at the end of his Parochial Antiquities.

**GLOSSOCOMON**, in surgery, an instrument, or sort of case, contrived by the ancient surgeons, for containing a fractured leg or thigh.

**GLOSSOCOMON**; in mechanics, the name by which Hiero calls a machine, composed of several dented wheels with pinions, and used for raising great weights.

**GLOSSOGAPHE**, in botany, a name used by some for fumitory.

**GLOSSOPETRA**, in natural history, a genus of extraneous fossils, so called from their having been supposed the tongues of serpents turned to stone, though they are really the teeth of sharks, and are daily found in the mouths of those fishes, wherever taken. See **FOSSILS**.

The several sizes of teeth of the same species, and the several different species of sharks, furnish us with a vast variety of these fossil teeth. Their usual colours are black, bluish, whitish, yellowish, or brown. In shape they are usually some-

what approaching to triangular; some are simple, and others have a smaller point on each side the large one; many of them are quite straight, but they are frequently met with crooked, and bent in all the different directions, some inwards, some outwards, and some sideways: they are also of various sizes, the larger ones being four or five inches long, and the smaller less than a quarter of an inch. See plate **CXXIV. fig. 1.**

They are found with us in the strata of blue clay, and are very plentiful in the clay-pits of Richmond, and some other places; but they are no where so common as in the island of Malta.

**GLOTTIS**, in anatomy, the mouth or aperture of the larynx, through which the air ascends and descends in respiring. It is of an elliptic figure, and furnished with cartilages and muscles, by means of which it is occasionally dilated or straitened, so as to give that wonderful variety of notes, of which the voice is capable, in speaking and singing. See the article **LARYNX**.

**GLOTTIS**, in ichthyology, a name sometimes given to the limosa. See the article **LIMOSA**.

**GLOUCESTER**, or **GLOCESTER**. See the article **GLOCESTER**.

**GLOVE**, a covering for the hand and wrist. Gloves, with respect to commerce, are distinguished into leathern-gloves, silk-gloves, thread-gloves, cotton-gloves, worsted-gloves, &c. Leathern gloves are made of chamois, kid, lamb, doe, elk, buff, &c.

Foreign gloves, on their importation, pay the following duties, *viz.* gloves of Canary, Milan, or Venice, unwrought, the dozen pair, pay 4s. 9  $\frac{4}{8}$  d. draw back 4s. 3  $\frac{7}{8}$  d. Those of Canary, Milan, or Venice, wrought with gold or silver, the dozen pair, pay 19s. 1  $\frac{8}{8}$  d. draw back 17s. 3d. French gloves, the gross, pay 1l. 13s. 10  $\frac{12}{100}$  d. draw back 1l.

1  $\frac{8}{100}$  d. French, wrought with gold or silver, the dozen pair, pay 2l. 14s. 1  $\frac{8}{8}$  d. draw back 1l. 12s. 3d. Spanish gloves, plain, the dozen pair, pay 3s. 7  $\frac{8}{100}$  d. draw back 3s. 2  $\frac{81}{100}$  d. Silk-gloves knit, the dozen pair, pay 11s. 5  $\frac{4}{100}$  d. draw back 10s. 6d. More or every pound weight 1s. 10  $\frac{5}{100}$  d. draw back 1s. 10  $\frac{5}{100}$  d. Those of Vandon, the

dozen pair, pay 2s. 4  $\frac{72\frac{1}{2}}{100}$ d. drawback  
2s. 1  $\frac{87\frac{1}{2}}{100}$ d. And more for such as are

made of leather, for every 20s. value,  
upon oath, 6s.

**GLOUTIUS**, in anatomy, a muscle more  
usually called the glutæus major.

**GLOW-WORM**, the english name of an  
insect, called by zoologists cicindela.  
See the article **CICINDELA**.

**GLUCKSTAT**, a fortified town of Ger-  
many, situated on the east side of the ri-  
ver Elbe, thirty miles north-west of  
Hamburgh: east lon. 9°, and north lat.  
54° 20'.

**GLUE**, among artificers, a tenacious vis-  
cid matter, which serves as a cement to  
bind or connect things together.

Glues are of different kinds, according to  
the various uses they are designed for, as  
the common glue, glove-glue, and parch-  
ment-glue; whereof the two last are more  
properly called size. See **SIZE**.

The common or strong glue is chiefly  
used by carpenters, joiners, cabinet-  
makers, &c. and the best kind is that  
made in England, in square pieces of a  
ruddy brown colour; and, next to this,  
the flanders-glue. It is made of the skins  
of animals, as oxen, cows, calves, sheep,  
&c. and the older the creature is, the  
better is the glue made of its hide.  
Indeed, whole skins are but rarely used  
for this purpose, but only the shavings,  
parings, or scraps of them; or the feet,  
sinews, &c. That made of whole skins,  
however, is undoubtedly the best; as that  
made of sinews is the very worst.

*The method of making GLUE.* In making  
glue of parings, they first steep them two  
or three days in water; then washing them  
well out, they boil them to the consistence  
of a thick jelly; which they pass, while  
hot, through ozier-baskets, to separate  
the impurities from it, and then let stand  
some time, to purify it further: when all  
the filth and ordures are settled to the  
bottom of the vessel, they melt and boil  
it a second time. They next pour it into  
flat frames or moulds, whence it is taken  
out pretty hard and solid, and cut into  
square pieces or cakes. They afterwards  
dry it, in the wind, in a sort of coarse net;  
and at last string it, to finish its drying.  
The glue made of sinews, feet, &c. is  
managed after the same manner; only  
with this difference, that they bone and  
scour the feet, and do not lay them to  
steep.

The best glue is that which is oldest;  
and the surest way to try its goodness, is  
to lay a piece to steep three or four days,  
and if it swell considerably without melt-  
ing, and when taken out resumes its for-  
mer driness, it is excellent.

A glue that will hold against fire or wa-  
ter, may be made thus: mix a handful  
of quick-lime with four ounces of linseed-  
oil; boil them to a good thickness, then  
spread it on tin-plates in the shade, and  
it will become exceeding hard, but may  
be easily dissolved over a fire, as glue,  
and will effect the business to admiration.

*Method of preparing and using GLUE.* Set  
a quart of water on the fire, then put in  
about half a pound of good glue, and  
boil them gently together till the glue be  
entirely dissolved and of a due consistence.  
When glue is to be used, it must be made  
thoroughly hot; after which, with a  
brush dipped in it, besmear the faces of the  
joints as quick as possible; then clapping  
them together, slide or rub them length-  
wise one upon another, two or three  
times, to settle them close; and so let  
them stand till they are dry and firm.

*Fish-GLUE*, a name sometimes given to  
ichthyocolla. See **ICHTHYOCOLLA**.

**GLUME**, *gluma*, among botanists, a kind  
of cup, consisting of two or three mem-  
branous valves, which are often pellucid  
at their edges. This sort of cup belongs  
to the grasses.

**GLUTÆUS**, in anatomy, the name of  
three muscles, which form the buttocks,  
and from their size are called maximus,  
medius, and minimus. They all arise  
in the external surface of the ilium, if-  
chium, and os sacrum: the termination  
of the first, or greatest, is about four  
fingers-breadth from the great trochanter,  
and the terminations of the two others  
are in this trochanter.

**GLUTINATIVE MEDICINES**, the same  
with agglutinants. See **AGGLUTINANTS**.

**GLYCINE**, **SCARLET-PEA**, in botany, a  
genus of the *diadelphia-decandria* class of  
plants, with a papilionaceous flower, and  
an oblong bilocular pod, containing a  
number of kidney-shaped seeds, of a scar-  
let colour, spotted with black.

**GLYCONIAN VERSE**, in ancient poetry,  
consists of three feet, whereof the first is  
a spondee, the second a choriambus, and  
the last a pyrrhichius; or the first may be  
a spondee, and the other two dactyls.

Thus, *Mens re-|gnum bona pos-|sidet.*  
or, *Mens re-|gnum bona |possidet.*

**GLYCYRRHIZA**,

**GLYCYRRHIZA, LIQUORICE**, in botany, a genus of the *diadelphia-decandria* class of plants, with a papilionaceous flower, consisting of four petals; the fruit is an oblong, compressed, and unilocular pod, containing a few kidney-shaped seeds.

For the description and medicinal virtues of liquorice, see the article **LIQUORICE**.

**GLYPH**, in sculpture and architecture, denotes any canal or cavity, used as an ornament.

**GLYSTER, or CLYSTER**, among physicians. See the article **CLYSTER**.

**GMELENA**, in botany, a genus of the *didynamia-angiospermia* class of plants, the flower of which is campanulated, and also divided into four segments; the fruit is a globose unilocular berry, surrounding a bilocular nut or kernel.

**GNAPHALIUM, CUDWEED**, in botany, a genus of the *syngenesia-polygamia-superflua* class of plants, with numerous hermaphrodite flowers on its disc, and a few female ones on the verge; there is no pericarpium; the seeds, which are oblong, single, and crowned with down, being contained in the cup.

Cudweed is esteemed drying and astringent, and recommended in dysenteries, hæmorrhages, and all kinds of fluxes; but the modern pharmacy makes little use of it.

**GNAPHALIUM** is also used by some for filago. See the article **FILAGO**.

**GNAPHALOIDES**, the name of a plant called by Linnæus *micropus*. See the article **MICROPUS**.

**GNAT**, in zoology, an insect of the fly-kind, called by authors *culex*. See the article **CULEX**.

There are several species of gnats, distinguished partly by their size, and partly by the different colours with which they are variegated, as black, brown, grey, yellow, &c. They belong to the order of two-winged flies.

**GNESNA**, the capital city of great Poland, situated one hundred and ten miles west of Warsaw: east lon.  $18^{\circ}$ , and north lat.  $53^{\circ}$ .

It is the see of an archbishop, who is always primate of Poland. See the article **POLAND**.

**GNIDIA**, in botany, a genus of the *ostandria-monogynia* class of plants, the flower of which consists of four petals, inserted into the cup; there is no pericarpium; the seed is single, and retained in the bottom of the cup.

**GNOME** is often used in a synonymous sense with apophthegm. See **APOPTHHEGM**.

**GNOMES, gnomi**, certain invisible people, who, according to the cabbalists, inhabit the inner parts of the earth. They are supposed small in stature, and the guardians of quarries, mines, &c. See the article **CABBALISTS**.

**GNOMON**, in dialling, the style, pin, or cock of a dial; which, by its shadow, shews the hour of the day. The gnomon of every dial represents the axis of the world. See **DIAL** and **DIALLING**.

**GNOMON**, in geometry. If, in a parallelogram ABCD (pl. CXIX. fig. 1. n<sup>o</sup> 1.) the diameter AC be drawn; also two lines EF, HI, parallel to the sides of the parallelogram, and cutting the diameter in one and the same point G, so that the parallelogram is, by these parallels, divided into four parallelograms, then are the two parallelograms DG, BG, through which the diameter does not pass, called complements; those through which the diameters pass, EH, FI, are called the parallelograms about the diameter; and a gnomon consists of the two complements, and either of the parallelograms about the diameter, viz. GD + HE + EI, or GD + FI + GB.

**GNOMON**, in astronomy, a style erected perpendicular to the horizon, in order to find the altitude of the sun. Thus, in the right-angled triangle ABC *ibid.* n<sup>o</sup> 2. are given, AB the length of the style, BC the length of its shadow, and the right angle ABC. Hence, making CB the radius, we have this analogy for finding the angle ACB, the sun's altitude, viz. BC:AB::radius:tangent of the angle C.

By means of a gnomon, the sun's meridian altitude, and consequently the latitude of the place, may be found more exactly than with the smaller quadrants. See the article **QUADRANT**.

By the same instrument, the height of any object GH may be found; for as DF (*ibid.* n<sup>o</sup> 3.) the distance of the observer's eye from the gnomon, is to DE, the height of the style; so is FH, the distance of the observer's eye from the object, to GH, its height.

**GNOMON** of a globe, the index of the hour-circle. See the article **GLOBE**.

**GNOMONIC**, something belonging to a gnomon. See the preceding article.

**GNOMONIC COLUMN**. See **COLUMN**.

**GNOMONIC PROJECTION**. See the article **PROJECTION**.

**GNOMONICS**,

**GNOMONICS**, *gnomonica*, the art of dialling, or of drawing sun and moon-dials, on any given plane. See the articles **DIAL** and **DIALLING**.

**GNOSTICS**, in church-history, christian heretics so called, it being a name which amongst all the antient heretics affected to take, to express that new knowledge and extraordinary light, to which they made pretensions; the word gnostic signifying a learned, or enlightened person.

St. Epiphanius ascribes the origin of the gnostics to Simon Magus, and says that they acknowledged two principles, a good and a bad. They supposed there were eight different heavens, each of which was governed by its particular prince: the prince of the seventh heaven, whom they named Sabaoth, created the heavens and the earth, the six heavens below him, and a great number of angels. In the eighth heaven they placed their Barbelo, or Barbéro, whom they sometimes called the father and sometimes the mother of the universe. All the gnostics distinguished the creator of the universe from God, who made himself known to men by his Son, whom they acknowledged to be the Christ. They denied that the Word was made flesh; and asserted that Jesus Christ was not born of the virgin Mary, that he had a body only in appearance, and that he did not suffer in reality. They neither believed a resurrection, nor a judgment to come; but imagined that those who had not been instructed in their maxims, would return into the world, and pass into the bodies of hogs and other of the like animals. They had several apocryphal books, as the Gospel of St. Philip, the Revelations of Adam, the Gospel of Perfection, &c.

**GO** is sometimes used, in a special signification, in our law; as *to go without day*, is to be dismissed the court.

**Go**, in ichthyology, a name sometimes given to the sea-gudgeon.

**GOA**, a city and sea-port of the hither India, situated in an island of the river Mandoua, and subject to the Portuguese: east lon. 73° 20', and north lat. 15° 20'.

**GOAD**, a pointed stick, or rod, armed with a sharp iron-pin at the end, to prick oxen or other cattle forwards.

**GOAL**, or **GAOL**. See **GAOL**.

**GOARING**, or **GOREING**, in the sea-language. See **GOREING**.

**GOAT**, *capra*, in zoology, a quadruped of the order of the pecora. See the article **CAPRA**.

The common goat with carinated and arcuated horns, is nearly of the size of the sheep, only that the wool of the latter makes it appear larger. The furr of the goat is of a pale dun, and the hairs rigid and waved, but not curled as in the sheep. It is a native of most parts of Europe. The buck goat has under his jaws two wattles or tufts like a beard. The female also resembles the male, and is valued if she have large teats, a great udder, and no horns, or at least very small ones. These animals require almost nothing to keep them. Their milk is esteemed the greatest nourisher of all liquids, women's milk excepted, and very comfortable to the stomach. The young kids also are very good for the table, and may be managed in all respects like lambs.

**GOAT'S BEARD**, *tragopogon*, in botany, See the article **TRAGOPOGON**.

**GOAT'S EYE**, *agias*, among antient physicians. See the article **ÆGIAS**.

**GOAT-FISH**, *caprifiscus*, in ichthyology. See the article **CAPRISCUS**.

**GOAT'S RUE**, *galega*, in botany. See the article **GALÉGA**.

**GOAT'S STONES**, a name by which some call orchis. See the article **ORCHIS**.

**GOAT-SUCKER**, *caprimulgus*, in ornithology, a species of hirundo. See the article **HIRUNDO**.

**GOAT'S THORN**, the same with tragacanth.

**Gobelins**, a celebrated manufactory for tapestry, established by Mr. Colbert, at Paris, in 1667. See **TAPESTRY**.

**GOBIO**, a species of cyprinus, with the upper jaw longest, and two cirri at the mouth.

**GOBIONARIA**, a species of gobius. See the next article.

**GObIUS**, in ichthyology, a genus of acanthopterygious fishes, with five small bones in the membrane of the gills, and the belly-fins of which grow together into a funnel-shape.

To this genus belongs, 1. The sea-gudgeon, or variegated gobius with fourteen rays in the hinder back-fin; it grows to eight inches in length, and is tolerably thick in proportion: it is very beautifully variegated with brown, white, yellow, green, blue, and black. See pl. CXXIII. fig. 1. n° 1. 2. The paganellus, or gobius with a yellow transverse line on the top of the first back-fin: it grows to about six inches in length, and is tolerably thick in proportion (*ibid.* n° 2.) 3. The jozo, or gobius with the ventral

fin blue, and the rays of the back-fin as-  
furgent. 4. The aphua, or apya-cobi-  
tes, or small gobius with a great many  
rays in the second back-fin : its length is  
only an inch and half. (*ibid.* n<sup>o</sup> 3.)

**Gobi**us is also a name used by different  
authors for several other distinct fishes.  
*viz.* 1. The cyprinus with the upper  
jaw longest, and two cirri at the mouth :  
this is the gobius fluviatilis. 2. The  
pearch with eight or nine black transverse  
lines on each side. And, 3. The smooth  
cottus with two spines on the head. See  
the article **CYPRINUS**, **PEARCH**, &c.

**GOBLET**, a large drinking-cup of a round  
figure, without either foot or handle.

**GOBONE**, or **GOBONY**, in heraldry, the  
same with componed. See **COMPO**ned.

**GOCHT**, a town of Westphalia, about  
seven miles south of Cleves.

**GOD**, *Deus*, the supreme being, the first  
cause or creator of the universe, and the  
only true object of religious worship.

The Hebrews called him Jehovah; which  
name they never pronounced, but used  
instead of it the words Adonai, or Eloe-  
him. See the articles **ADONAI**, **ELOHIM**,  
and **JEHOVAH**.

God, says sir Isaac Newton, is a relative  
term, and has respect to servants. It  
denotes, indeed, an eternal, infinite, ab-  
solutely perfect being : but such a being  
without dominion, would not be god.  
The word god frequently signifies lord,  
but every lord is not god. The domi-  
nion of a spiritual being, or lord, consti-  
tutes god ; true dominion, true god ; the  
supreme, supreme ; pretended, pretend-  
ed. From such true dominion it follows  
that the true God is living, intelligent, and  
powerful ; and from his other perfec-  
tions, that he is supreme, or supremely  
perfect. He is eternal and infinite, om-  
nipotent and omniscient ; that is, he en-  
dures from eternity to eternity, and is  
present from infinity to infinity. He go-  
verneth all things that exist, and knows all  
things that are to be known. He is not  
eternity or infinity, but eternal and infi-  
nite. He is not duration and space, but  
he endures and is present : he endures al-  
ways, and is present every where ; and  
by existing always and every where, con-  
stitutes the very things we call duration  
and space, eternity and infinity. He is

omnipresent, not only virtually, but sub-  
stantially ; for power without substance  
cannot subsist. All things are contained  
and move in him, but without any mu-  
tual passion ; that is, he suffers nothing

from the motions of bodies, nor do they  
undergo any resistance from his omni-  
presence.

It is confessed, that god exists necessarily ;  
and by the same necessity he exists always  
and every where. Hence also he must be  
perfectly similar ; all eye, all ear, all brain  
all arm, all perception, intelligence, and  
action ; but after a manner not at all cor-  
poreal, not at all like men ; after a man-  
ner altogether unknown to us. He is de-  
stitute of all body, and bodily shape,  
and therefore cannot be seen, heard, or  
touched ; nor ought to be worshipped un-  
der the representation of any thing corpo-  
real. We know him only by his pro-  
perties, or attributes, by the most wise  
and excellent structure of things, and by  
final causes : but we adore and worship  
him only on account of his domini-  
on ; for God, setting aside dominion,  
providence, and final causes, is nothing  
else but fate and nature.

The plain argument, says Mr. Mac-  
laurin, for the existence of the deity, obvi-  
ous to all, and carrying irresistible con-  
viction with it, is from the evident con-  
trivance and fitness of things for one an-  
other, which we meet with throughout all  
parts of the universe. There is no need  
of nice or subtle reasonings in this mat-  
ter ; a manifest contrivance immediately  
suggests a contriver. It strikes us like a  
sensation ; and artful reasonings against  
it may puzzle us, but it is without shak-  
ing our belief. No person, for example,  
that knows the principles of optics and  
the structure of the eye, can believe that  
it was formed without skill in that sci-  
ence ; or that the ear was formed without  
the knowledge of sounds ; or that the  
male and female in animals were not  
formed for each other, and for continu-  
ing the species. All our accounts of na-  
ture are full of instances of this kind.  
The admirable and beautiful structure of  
things for final causes, exalt our idea of  
the contriver : the unity of design shews  
him to be one. The great motions in  
the system, performed with the same fa-  
cility as the least, suggest his almighty  
power, which gave motion to the earth  
and the celestial bodies with equal ease as  
to the minutest particles. The subtilty  
of the motions and actions in the internal  
parts of bodies, shews that his influence  
penetrates the inmost recesses of things,  
and that he is equally active and present  
every where. The simplicity of the laws  
that prevail in the world, the excellent  
disposition

disposition of things, in order to obtain the best ends, and the beauty which adorns the works of nature, far superior to any thing in art, suggest his consummate wisdom. The usefulness of the whole scheme, so well contrived for the intelligent beings that enjoy it, with the internal disposition, and moral structure of those beings themselves, shew his unbounded goodness. These are the arguments which are sufficiently open to the views and capacities of the unlearned; while, at the same time they acquire new strength and lustre from the discoveries of the learned. The deity's acting and interposing in the universe, shew that he governs, as well as formed it; and the depth of his counsels, even in conducting the material universe, of which a great part surpasses our knowledge, keep up an inward veneration and awe of this great being, and dispose us to receive what may be otherwise revealed to us, concerning him. It has been justly observed that some of the laws of nature now known to us, must have escaped us, if we had wanted the sense of seeing. It may be in his power to bestow upon us other senses, of which we have at present no idea; without which it may be impossible for us to know all his works, or to have more adequate ideas of himself. In our present state, we know enough to be satisfied of our dependency upon him, and of the duty we owe to him, the lord and disposer of all things. He is not the object of sense; his essence, and indeed that of all other substances, is beyond the reach of all our discoveries: but his attributes clearly appear in his admirable works. We know, that the highest conceptions we are able to form of them, are still beneath his real perfections; but his power and dominion over us, and our duty towards him, are manifest.

Though God has given us no innate ideas of himself, says Mr. Locke, yet having furnished us with those faculties our minds are endowed with, he hath not left himself without a witness; since we have sense, perception, and reason, and cannot want a clear proof of him, as long as we carry ourselves about us. To shew, therefore, that we are capable of knowing, that is, being certain that there is a God; and how we may come by this certainty, I think we need go no farther than ourselves, and that undoubted knowledge we have of our own existence. I think it is beyond question, that man has a clear

perception of his own being: he knows certainly that he exists, and that he is something. In the next place, man knows, by an intuitive certainty, that bare nothing can no more produce any real being, than it can be equal to two right angles. If, therefore, we know there is some real being, it is an evident demonstration, that from eternity there has been something: since what was not from eternity, had a beginning; and what had a beginning, must be produced by something else. Next it is evident, that what has its being from another, must also have all that which is in and belongs to its being from another too: all the powers it has, must be owing to, and received from the same source. This eternal source then of all being, must be also the source and original of all power; and so this eternal being must be also the most powerful.

Again, man finds in himself perception and knowledge: we are certain then that there is not only some being, but some knowing intelligent being in the world. There was a time then, when there was no knowing being, or else there has been a knowing being from eternity. If it be said, there was a time when that eternal being had no knowledge; I reply, that then it is impossible there should have ever been any knowledge: it being as impossible that things wholly void of knowledge, and operating blindly, and without any perception, should produce a knowing being, as it is impossible that a triangle should make itself three angles bigger than two right ones. Thus, from the consideration of ourselves, and what we infallibly find in our own constitutions, our reason leads us to the knowledge of this certain and evident truth, that there is an eternal, most powerful, and knowing being, which whether any one will call God, it matters not. The thing is evident; and from this idea, duly considered, will easily be deduced all those other attributes we ought to ascribe to this eternal being.

From what has been said, it is plain to me, that we have a more certain knowledge of the existence of a God, than of any thing our senses have not immediately discovered to us. Nay, I presume I may say, that we more certainly know that there is a God, than that there is any thing else without us. When I say, we know, I mean, there is such a knowledge within our reach, which we cannot miss, if

we will but apply our minds to that, as we do to several other inquiries.

It being then unavoidable for all rational creatures to conclude, that something has existed from eternity, let us next see what kind of thing that must be. There are but two sorts of beings in the world, that man knows or conceives; such as are purely material, without sense or perception; and sensible perceiving beings, such as we find ourselves to be. These two sorts we shall call cogitative and incogitative beings; which, to our present purpose, are better than material and immaterial.

If then there must be something eternal, it is very obvious to reason, that it must necessarily be a cogitative being; because it is as impossible to conceive that bare incogitative matter should ever produce a thinking intelligent being, as that nothing of itself should produce matter. Let us suppose any parcel of matter eternal, we shall find it in itself unable to produce any thing. Let us suppose its parts firmly at rest together; if there were no other being in the world, must it not eternally remain so, a dead unactive lump? is it possible to conceive that it can add motion to itself, or produce any thing? Matter then, by its own strength, cannot produce in itself so much as motion. The motion it has, must also be from eternity, or else added to matter by some other being, more powerful than matter. But let us suppose motion eternal too; but yet matter, incogitative matter, and motion could never produce thought. Knowledge will still be as far beyond the power of nothing to produce. Divide matter into as minute parts as you will, vary its figure and motion as much as you please, it will operate no otherwise upon other bodies, of proportionable bulk, than it did before this division. The minutest particles of matter, knock, repel, and resist one another, just as the greater do, and that is all they can do: so that if we suppose nothing eternal, matter can never begin to be: if we suppose only matter and motion eternal, thought can never begin to be: for it is impossible to conceive, that matter, either with or without motion, could have originally in and from itself, sense, perception, and knowledge, as is evident from hence, that then sense, perception, and knowledge must be a property eternally inseparable from

matter, and every particle of it. Since, therefore, whatsoever is the first eternal being, must necessarily be cogitative; and whatsoever is first of all things, must necessarily contain in it, and actually have at least all the perfections that can ever after exist; it necessarily follows, that the first eternal being cannot be matter. If, therefore, it be evident, that something must necessarily exist from eternity, it is also as evident, that that something must be a cogitative being. For it is as impossible that incogitative matter should produce a cogitative being, as that nothing, or the negation of all being, should produce a positive being, or matter.

This discovery of the necessary existence of an eternal mind, sufficiently leads us to the knowledge of God: for it will hence follow, that all other knowing beings that have a beginning, must depend on him, and have no other ways of knowledge or extent of power, than what he gives them; and therefore if he made those, he made also the less excellent pieces of this universe, all inanimate bodies, whereby his omniscience, power, and providence will be established; and from thence all his other attributes necessarily follow.

With respect to christians, it need only be just mentioned, that they were very early divided in opinion, as to the nature and essence of the supreme Being; a great part worshipping three persons in the unity of the godhead, whilst others absolutely rejected a trinity of persons, and asserted the unity of the divine nature, both as to person and substance. See the articles ARIAN and TRINITARIAN.

With respect to the theology of the pagans, it is thought by most learned men, that they acknowledged but one God; and that the many different divinities worshipped by them, were but attributes and actions of one and the same God. This may probably be true of the wiser heathens; and indeed there are many strong and beautiful passages in pagan authors, to prove that these acknowledged but one God. Thus Pythagoras taught the unity of God, and defined him to be a mind penetrating and diffusing itself through all the parts of the universe, from which all animals receive life: and Plato called God the being which is; and whenever he mentions the deity, it is always in the singular number.

It is a celebrated division of the heathen gods into *dei majorum gentium*, and *dei*

*minorum gentium* ; that is, into the superior and inferior gods. Another division was taken from their place of residence ; thus there were celestial, terrestrial, infernal, marine, and sylvan gods. They were also divided into animal and natural gods : the animal gods were mortals, who had been raised to divinity by ignorance and superstition (see *APOTHEOSIS*) ; and the natural gods, the parts of nature, such as the stars, the elements, mountains, rivers, &c. There were also deities, who were supposed to preside over particular persons : some had the care of women in child-birth ; others, the care of children and young persons ; and others were the deities of marriage. Each action, virtue, and profession had also its particular god : the shepherds had their Pan ; the gardeners, their Flora ; the learned, their Mercury and Minerva ; and the poets, their Apollo and the Muses. See the articles *GENII*, *LARES*, *PENATES* ; &c.

**GODALMIN**, a market-town of Surry, thirty miles south-west of London.

**GOD-BOTE**, an ecclesiastical fine imposed for offences against God.

**GODDES**, a heathen deity of the female sex.

The antients had almost as many goddesses, as gods ; such were Juno, the goddess of air ; Diana, the goddess of woods, &c. and under this character were represented the virtues, graces, and principal advantages of life, Truth, Justice, Piety, Liberty, Fortune, Victory, &c.

It was the peculiar privilege of the goddesses to be represented naked on medals ; for it was supposed that the imagination must be awed and restrained by the consideration of the divine character.

**GOD-FATHERS**, and **GOD-MOTHERS**, persons who at the baptism of infants, answer for their future conduct, and solemnly promise that they will renounce the devil and all his works, and follow a life of piety and virtue, and by this means lay themselves under an indispensable obligation to instruct them, and watch over their conduct.

This custom is of great antiquity in the christian church, and was probably instituted to prevent children being brought up in idolatry, in case their parents died before they arrived at years of discretion.

The number of god-fathers and god-mothers is reduced to two, in the church of Rome ; and three, in the church of

England : but formerly they had as many as they pleased.

**GOES**, a port town of Zeland, in Holland, ten miles east of Middleburgh.

**GOGET**, a name sometimes given to the sea gudgeon. See the article *Gobi*.

**GOGMAGOG-HILLS** lie three miles south-east of Cambridge : remarkable for the intrenchments cast up on them.

**GOITO**, a city of Italy, ten miles north-west of Mantua.

**GOLCONDA**, the capital of a province of the same name, in the hither India : east lon. 77°, and north lat. 16°.

**GOLD**, *aurum*, a yellow metal, the heaviest, purest, most ductile, and shining, and on these accounts the most valuable of all metals. See the article *METAL*.

Gold is the most frequently found native of all the metals ; and is indeed very rarely found in a state of ore, that is, divested of its metallic form, by it particles being penetrated by, and intimately mixed with sulphur : and in the few instances in which it is found thus, it never constitutes a peculiar ore, but is found intermixed among the ores of other metals ; and most frequently among those of silver, or those of which, though some other be the predominant metal, yet there is a large quantity of silver among it, in which the gold lies in its state of ore. See the article *ORE*.

Native gold, though free from the penetrating sulphurs which reduce metals to ores, is yet very seldom found pure, but has almost constantly an admixture of silver with it, and very frequently of copper : when it has copper in it, it is easily discovered, if in any considerable quantity, by its hardness : the silver is not so easily detected in it. Native gold is sometimes found in pure masses of considerable size, many having been found of more than a pound weight : these masses are met with in the gold-mines, and are called *aurum obryzum*, or *obryzum*, but they are very rare : such, however, have been sometimes found in the german mines. See the article *MINE*.

Its more common appearance, in its more loose state, is in form of what is called gold-dust : this is native gold in smaller masses, usually indeed very small, mixed among the sands of rivers. This is found in many parts of the world, but the greatest quantity of it is from Guinea : some of it is to be met with in the beds of some of the rivers in Scotland. Native gold, in a middle state as to size between these



two kinds, is also found in the cliffs or perpendicular fissures of the solid strata in the mountains of Chili. These fissures are filled up partly with reddish marle, partly with native gold immersed in a debased crystalline stone, of a bluish hue; and partly with loose native gold, which is usually found in flat pieces, from the size of a pea to that of a horse bean: the quantity however, so far as has been yet discovered, is not great.

These, though not unfrequent in those parts of the world where there is gold, are, however, far from being its most common appearance; for it is generally and in the greatest abundance found bedded in masses of hard stone, which lie at vast depths; being often dug at a hundred and fifty fathoms: there is no peculiar stone in which the gold is found in those places, but it is met with indiscriminately in several kinds; some soft, some harder, and even in earths. The richest masses are usually of a whitish, and somewhat bright, but opaque stone, which is a debased crystal, containing a large quantity of a white earth: this is often tinged in part also with black, and sometimes with other colours: yet thro' all the different stains the nature and texture of the stone may be easily discovered to be the same; and often the whole variety of colours will be found in one mass. In this stone, the gold lies in a very beautiful form, and a great variety of figures; some parcels of it are variously divaricated, or in form of small branched figures, but these are very rare. Others are variously interwoven in narrower, or broader veins; and others in small flat spangles, intermixed with specks of black: the stone in which this is lodged will very readily give fire with steel, and will not at all ferment with aqua fortis.

Besides this, however, there are many other stones in the mines of Peru, which hold considerable quantities of gold, visible in large or smaller specks; and these are of all colours, but usually white or reddish: the gold in these is usually in small spangles, but there is no certainty either in the size of the masses of pure native gold in this, or any other state; that of the coasts of Guinea, usually called gold-dust, and commonly finer than the smaller sands, yet sometimes affords pieces of three or four ounces weight; and the lumps of *aunum obryzum*, as it is called, have been found

between twenty and thirty pound weight: these things, however, are not common.

*Properties of GOLD.* The chemists tell us, that gold is composed of two substances; the one an extremely pure and simple matter, of the nature of mercury, and the other, which, they say, fixes or destroys the fluidity of this, an equally pure and simple substance, extremely subtle, and of the nature of sulphur. We are not, says Dr. Hill, to take all this upon the credit of those who affirm it; for by all the trials that have been made, gold seems the most simple of all substances. It is the heaviest of all known bodies; and it is the most ductile of all the metals. See the articles *GRAVITY* and *DUCTILITY*.

It is wholly incapable of rust, and is not sonorous when struck upon. It requires a strong fire to melt it, remaining unaltered in the degree of heat that fuses tin or lead, but running with a less vehement one than is necessary to the fusing of iron, or copper. It does not retain its colour, till the time of its melting, but becomes ignited and white, before it runs, and when in fusion it appears of a pale, bluish, green colour on the surface. It amalgamates the most readily of all the metals with quicksilver. When in a state of fusion, it very easily, and very intimately blends itself with silver, and when mixt with that metal, will also run into a mass with iron. Either silver or gold may indeed be mixed singly with this metal, by fusion, but it is much more easily done with regard to gold, when before blended with silver. It much more easily mixes with copper, and the other metals; and very readily with some of the semimetals, as with the regulus of antimony: common fire carried to its utmost vehemence, has no further effect on gold than the fusing it. It will remain ever so long in its fiercest heat, and come out at last unaltered, and with its whole weight. Exposed to the focus of the strongest burning-glasses, it sparkles and flies off in small masses, which if recovered on paper, and examined afterwards, are found to be pure unaltered gold; but if the heat be managed very nicely, and the same gold again and again exposed to it, it is affirmed that a part of the gold will at length go off in fumes, and the remainder will be found to be a substance of a deep blue, with some admixture of purple; and approaching to the nature

of vitriol, rather than of gold, of which it wants the malleability, and the specific gravity.

The proper solvent of gold is aqua regia: this menstruum owes its power upon this metal to the sea salt it contains; that being almost the only salt which has the quality of acting upon gold. The effect of this menstruum affords us one test for this metal; if we require another, we may have recourse to a fusion with antimony: for if pure gold and antimony be blended together, the antimony upon keeping up the fire to a great height will be driven off in fumes, and will leave the gold, if pure, unaltered in weight; whereas, if it contained any mixture of another metal, the antimony would have taken it away with it, not excepting even silver itself. See the articles *AQUA REGIA* and *ANTIMONY*.

If a quantity of salt of tartar, or any other fixed alkali, be thrown into a solution of gold, the metal is precipitated in form of a powder, which has an explosive power greater than that of gunpowder, or the pulvis fulminans of the chemists. This powder, from its property, is called aurum fulminans. See the article *AURUM*.

Gold is greatly the most divisible of all bodies. If melted with a hundred thousand times its weight of silver, it will perfectly and equally blend itself with that metal: any grain of the melted mass being cut off, will be found on assaying, to contain its due and proportionate quantity of the gold in it; and a single drop of a solution of gold in aqua regia, will communicate a metalline taste to a pint of spirit of wine, if mixed with it.

It is to be observed, that aqua regia, tho' the general and common solvent of gold, is not the only one. Hunkel long since discovered, that it might be dissolved by the fumes arising from a mixture of oil of tartar, and oil of vitriol; and a menstruum in the common liquid form, may be produced from these which will have the same power. Mercury also is a true solvent of this metal by amalgamation; and the hepar sulphuris, or liver of sulphur, on being fused with it, takes it up so perfectly, that it will be carried into a lac sulphuris, either in the solution or precipitation. See *AMALGAMATION*. The chemical character to express gold is a circle with a point in the center thus,  $\odot$ . They intend this as a symbol of perfection and simplicity; the circle

being the most uniform of all figures; and comprehending the greatest space under the smallest superficies. See the article *CHARACTER*.

Numberless have been the attempts to convert other metals into gold; but as nothing is so hard to communicate by art as gravity, they are hitherto, and are likely always to be without success. See the article *PHILOSOPHER'S STONE*.

The degradation of gold seems as highly difficult as the making it: some industrious people have gone so far towards this, as to bring gold to a state in which no reducing fluxes they were acquainted with, could restore it again: but this is no proof that others might not have been invented that would have done it. The vapour of phosphorus, indeed, in a manner calcines gold into a sort of unmalleable matter of the appearance of a calx; and the same thing may be done by a long and gentle calcination of gold, that has been amalgamated with mercury: but people are able to reduce gold in this state, produced by either means, into pure malleable gold again.

*Method of imitating GOLD.* Dr. Shaw thinks the following method of Mr. Homberg, for treating copper with quicksilver, preferable in imitating gold for the making watches, buckles, cane-heads, snuff-boxes, &c. to any other.

If an amalgam be boiled in river-water for two hours; and then the quicksilver be distilled off, and cohobated once; then the remaining copper, being now fused, will be of a beautiful gold colour, and more ductile than copper, so as to become well fitted for watch-work, gilding, and the finer machines and utensils. See the article *AMALGAM*.

For the methods of separating and refining GOLD, see the articles *ASSAYING*, *COPELLING*, *CEMENTATION*, *DEPART*, *REFINING*, *ORE*, and *WASHING*.

*GOLD, in medicine.* The virtues of gold in medicine, however highly extolled by some writers, seem altogether imaginary. The Greeks never paid much respect to it in this way. Geoffroy tells us, that they never used it in medicine at all; but he seems mistaken, for Dioscorides prescribes the filings of this metal to those who had swallowed mercury. It first got footing as a medicine among the Arabians, and we find them prescribing it to be beat into thin leaves as an ingredient in

in many of their compositions. They tell us, that it is a cordial, and that it has great virtues against palpitations of the heart, nervous complaints, and melancholy. The chemists go farther, and talk of aurum potable as an universal medicine: but there seems no great credit to be given to any thing that has been said upon this head; and the present practice allows its use as an ornament only to medicines, not as a medicine itself: the only preparation of it that has been received on the footing of a medicine by rational people, is the aurum fulminans, and that has been of late proved to be a very mischievous one. For this, and the other preparations of gold, see the article **AURUM**.

**GOLD-WIRE**, a cylindrical ingot of silver, superficially gilt, or covered with gold at the fire, and afterwards drawn successively through a great number of little, round holes, of a wire-drawing iron, each less than the other, till it be sometimes no bigger than a hair of the head. See the article **WIRE**.

It may be observed, that before the wire be reduced to this excessive fineness, it is drawn through above an hundred and forty different holes, and that each time they draw it, it is rubbed afresh over with new wax, both to facilitate its passage, and to prevent the silver's appearing through it.

**GOLD-WIRE flattened**, is the former wire flattened between two rollers of polished steel, to fit it to be spun on a stick, or to be used flat, as it is without spinning, in certain stuffs, laces, embroideries, &c. See the article **STUFF**, &c.

**GOLD-THREAD, or SPUN GOLD**, is a flattened gold, wrapped or laid over a thread of silk, by twisting it with a wheel and iron bobbins.

*Manner of forming GOLD-WIRE, and GOLD-THREAD, both round and flat.* First, an ingot of silver, of twenty-four pounds, is forged into a cylinder, of about an inch in diameter: then it is drawn thro' eight or ten holes, of a large, coarse wire-drawing iron, both to finish the roundness and to reduce it to about three-fourths of its former diameter. This done, they file it very carefully all over to take off any filth remaining on the forge; then they cut it in the middle; and thus make two equal ingots thereof, each about twenty-six inches long, which they draw through several new holes, to take off any inequalities the file may

have left, and to render it as smooth and equable as possible.

The ingot thus far prepared, they heat it in a charcoal fire; then taking some gold leaves, each about four inches square, and weighing twelve grains, they join four, eight, twelve, or sixteen of these as the wire is intended to be more or less gilt; and when they are so joined, as only to form a single leaf, they rub the ingots reeking hot with a burnisher. These leaves being thus prepared, they apply over the whole surface of the ingot, to the number of six, over each other, burnishing or rubbing them well down with the blood-stone, to close and smoothe them. When gilt, the ingots are laid anew in a coal fire; and when raised to a certain degree of heat, they go over them a second time with the blood-stone, both to folder the gold more perfectly, and to finish the polishing. The gilding finished, it remains to draw the ingot into wire.

In order to this, they pass it through twenty holes of a moderate drawing iron, by which it is brought to the thickness of the tag of a lace: from this time the ingot loses its name, and commences gold wire. Twenty holes more of a lesser iron leaves it small enough for the least iron; the finest holes, of which last scarce exceeding the hair of the head, finish the work.

To dispose the wire to be spun on silk, they pass it between two rollers of a little mill: these rollers are of nicely polished steel, and about three inches in diameter. They are set very close to each other, and turned by means of a handle fastened to one of them, which gives motion to the other. The gold wire in passing between the two, is rendered quite flat, but without losing any thing of its gilding, and is rendered so exceedingly thin and flexible, that it is easily spun on silk thread, by means of a hand wheel, and so wound on a spool or bobin.

**GOLD-LEAF, or BEATEN GOLD**, is gold beaten with a hammer into exceeding thin leaves, so that it is computed, that an ounce may be beaten into sixteen hundred leaves, each three inches square, in which state it takes up more than 159052 times its former surface. See the article **DUCTILITY**.

This gold they beat on a block of black marble, about a foot square, and usually raised three feet high: they make use of three

three sorts of hammers, formed like mallets, of polished iron: the first, which weighs three or four pounds, serves to chafe, or drive: the second, of eleven or twelve pounds, to close; and the third, which weighs fourteen or fifteen pounds, to stretch and finish. They also make use of four moulds of different sizes, *viz.* two of vellum, the smallest whereof consists of forty or fifty leaves, and the larger of two hundred: the other two, consisting each of five hundred leaves, are made of bullocks guts well scoured, and prepared. See **MOULD**.

*Method of preparing and beating GOLD.*

They first melt a quantity of pure gold, and form it into an ingot: this they reduce, by forging, into a plate about the thickness of a sheet of paper; which done, they cut the plate into little pieces about an inch square, and lay them in the first or smallest mould to begin to stretch them: after they have been hammered here a while with the smallest hammer, they cut each of them into four, and put them into the second mould, to be extended further.

Upon taking them hence, they cut them again into four, and put them into the third mould, out of which they are taken, divided into four, as before, and laid in the last, or finishing mould, where they are beaten to the degree of thinness required.

The leaves thus finished, they take them out of the mould, and dispose them into little paper books, prepared with a little red bole for the gold to stick to; each book ordinarily contains twenty-five gold leaves. There are two sizes of these books; twenty-five leaves of the smallest only weigh five or six grains, and the same number of the largest, nine or ten grains.

It must be observed, that gold is beaten more or less, according to the kind or quality of the work it is intended for; that for the gold wire-drawers to gild their ingots withal, is left much thicker than that for gilding the frames of pictures, &c. withal. See **GILDING**.

**GOLD-FINCH**, in ornithology, the english name of a species of fringilla, with the wings variegated with black, yellow, and white. See the article **FRINGILLA**. The common gold-finch is a very elegantly coloured bird, somewhat smaller than the common sparrow. But besides this, there are several other species, as the Greenland gold-finch, with a black

spotted head, about the size of the common linnet; and the greenish yellow gold-finch, nearly of the size represented in plate CXVIII. fig. 1.

This last is a most elegant bird; the fore-part of its head, and the upper part of the throat being covered with fine scarlet-coloured feathers, the top of the head ash-coloured, and the upper part of the body a yellowish green.

**GOLD-COIN**. See the article **COIN**.

*Washing of GOLD-ORE*. See the article **WASHING of Ore**.

**GOLD-SIZE**. See the article **SIZE**.

**GOLD-SMITH**, or as some choose to express it, *silver-smith*, an artist who makes vessels, utensils, and ornaments in gold and silver.

The goldsmith's work is either performed in the mould, or beat out with the hammer, or other engine. All works that have raised figures, are cast in a mould, and afterwards polished and finished: plates, or dishes, of silver or gold, are beat out from thin flat plates; and tankards, and other vessels of that kind, are formed of plates soldered together, and their mouldings are beat, not cast. The business of the goldsmiths formerly required much more labour than it does at present; for they were obliged to hammer the metal from the ingot to the thinness they wanted: but there are now invented flattening-mills, which reduce metals to the thinness that is required, at a very small expence. The goldsmith is to make his own moulds, and for that reason ought to be a good designer, and have a taste in sculpture: he also ought to know enough of metallurgy, to be able to assay mixed metals, and to mix the alloy.

The goldsmiths in London employ several hands under them for the various articles of their trade: such are the jeweller, the snuff-box, and toy-maker, the silver turner, the gilder, the burnisher, the chaser, the refiner, and the gold-beater. See the article **JEWELLER**, &c.

Goldsmiths are superior tradesmen: their wares must be assayed by the wardens of the company of this name in London, and marked: and gold is to be of a certain touch. No goldsmith may take above one shilling the ounce of gold, besides what he has for the fashioning, more than the buyer may be allowed for it at the king's exchange; and here any false metal shall be seized and forfeited to the king. The cities of York, Exeter, Bristol,

Bristol, &c. are places appointed for the assaying wrought-plate of goldsmiths; also a duty is granted on silver-plate of six-pence an ounce, &c. Plate made by goldsmiths, shall be of a particular fineness, on pain of forfeiting 10*l*. and if any parcel of plate sent to the assayers is discovered to be of a coarser alloy than the respective standards, it may be broke, and defaced; and the fees for assaying are particularly limited.

*Burnished GOLD*, that smoothed or polished with a burnisher. See the articles *BURNISHER*, and *BURNISHING*.

*Mosaic GOLD*, that applied in pannels, on proper ground, distributed into squares, lozenges, and other compartments, part whereof is shadowed to heighten, or raise the rest. See the article *MOSAIC*.

*Shell-GOLD*, that used by the illuminers, and wherewithal we write gold letters. It is made of the pareings of leaf-gold, and even of the leaves themselves, reduced into an impalpable powder, by grinding on a marble with honey. After leaving it to infuse some time in aqua fortis, they put it in shells, where it sticks. To use it they dilute it with gum-water, or soap-water.

*Pure GOLD*, that purged by fire of all its impurities, and all alloy. See *ALLOY*. The moderns frequently call it gold of twenty-four caracts, but in reality there is no such thing as gold so very pure, and there is always wanting at least a quarter of a caract. Gold of twenty-two caracts, has one part of silver, and another of copper; that of twenty-three caracts has half a part, *i. e.* half a twenty-fourth of each. See *CARACT*.

*Standard value of GOLD COIN*. See *COIN*.

*GOLD*, in heraldry, is one of the metals, more usually called by the french name *or*. See the articles *METAL* and *OR*.

*Laws relating to GOLD manufactures*. Gold and silver beaten, wrought in papers, for the printers, are prohibited to be imported by 1 Richard III. Gold and silver thread, lace, fringe, or other works made thereof, are prohibited to be imported by the 10th of Anne. Upon oath, that the goods were actually made after the first of July, 1712, of plate, wire-spun upon silk, and security given that they shall not be re-landed in Great-Britain, &c. the exporter of gold lace, thread, and fringe, is to have the following allowance, *viz.* gold-lace, thread, or fringe, the pound weight averdupois, 6*s.* 8*d.*

*GOLDEN*, something that has a relation to gold, or consists of gold, is valuable, or the like; as,

*GOLDEN-BULL*. See the article *BULL*.

*GOLDEN-CALF*, in jewish antiquity, a figure which the Israelites cast in gold, and set up in the wilderness to worship during Moses's absence in the mount, and which that legislator, at his return, burnt, ground to powder, and mixed with the water the people were to drink of; as in Exod. xxxii.

*GOLDEN-FLEECE*, in the antient mythology, the skin, or fleece, of the ram upon which Phryxus and Hella are supposed to have swam over the sea to Colchis; which being sacrificed to Jupiter, its fleece was hung upon a tree in the grove of Mars, guarded by two brazen-hoofed bulls, and a monstrous dragon that never slept; but was at last taken and carried by Jason, and the Argonauts.

*Order of the GOLDEN-FLEECE*. See the article *FLEECE*.

*GOLDEN-NUMBER*, in chronology, a number shewing what year of the moon's cycle any given year is. See *CYCLE*. From what has been said under cycle of the moon, it appears that the golden number will not shew the true change of the moon for more than three hundred and twelve years, without being varied. It is to be observed, that the golden number is not so well adapted to the Gregorian as to the Julian calendar; the epact being more certain in the new style, to find which, the golden number is of use. See the article *EPACT*.

The rule for finding the golden number is already given under *CYCLE of the moon*, or *lunar CYCLE*, of which rule take this example for the year 1754

$$\begin{array}{r} \text{Add} \quad 1 \\ 19) 1755 (92 \\ \underline{171} \\ 45 \\ \underline{38} \\ 7 \text{ Golden N}^{\circ}. \end{array}$$

*GOLDEN-ROSE*. The pope annually consecrates a golden rose on the fourth Sunday in Lent, which is sent to princesses, or to some church, as a mark of his peculiar affection.

*GOLDEN-RULE*, in arithmetic, is also called the rule of three, and the rule of proportion. See *PROPORTION*, and *RULE OF THREE*.

*GOLDINGEN*, a city of Poland, in the dutchy of Courland, sixty miles west of

- of Mittau : east long. 22°, and north lat. 57°.
- GOLNAW**, a city of Brandenburg-Pomerania, fifteen miles north-east of Stetin : east long. 15°, north lat. 53° 40'.
- GOLPS**, in heraldry, are roundles of a purple tincture, called by the French *torceaux*, adding their peculiar colours.
- GOLTBERG-EARTH**, *goltbergenfis terra*, a species of bole. See **BOLE**.
- GOMATUS**, in ichthyology, the same with the gurnard. See **GURNARD**.
- GOMBRON**, the greatest sea-port town in Persia, situated on the strait at the entrance of the gulph of Persia, opposite to the island of Ormus : east long. 55° 30', north lat. 27° 30'.
- GOMERA**, one of the Canary-Islands, subject to Spain, and situated west of Teneriff : west long. 18°, north lat. 28°.
- GOMORRO-ISLANDS**, situated between 10° and 13° south lat. on the eastern coast of Africa.
- GOMPHOSIS**, *γομφωσις*, in anatomy, a species of articulation, wherein one bone is set in the other, like a nail or peg ; as the teeth within the jaws. See the article **ARTICULATION**.
- GOMPHRENA**, the **PURPLE EVERLASTING FLOWER**, in botany, a genus of the *pentandria-digynia* class of plants, the flower of which is divided into five parts, and erect : the petals are subulated and permanent : the fruit is a thin, roundish crust, with one cell, in which are contained a single, large, roundish seed, with an oblique end. It is a native of both East and West-Indies ; and the flower is usually of a beautiful purple colour.
- GONAGRA**, among physicians, signifies the gout in the knee. See **GOUT**.
- GONARCHA**, in antiquity, a dial delineated on several surfaces, or planes, some horizontal, others erect, oblique, &c. See the article **DIAL**.
- GONDOLA**, in naval architecture, a flat kind of boat, very long and narrow, chiefly used on the canals at Venice.
- GONDOLA-SHELL**, in natural history, a species of *dolium*, with an extremely wide mouth. See **DOLIUM**.
- GONFANON**, or **GONFALON**, a kind of banner, carried in the processions of the principal churches at Rome.
- GONGER**, in ichthyology, the same with conger. See the article **CONGER**.
- GONGOLARA**, in botany, the same with the *arica marina*, or sea-heath. See the article **FUCUS**.

**GONORRHOEA**, in medicine, an involuntary efflux of the seminal juices, and some other recrementitious matter. Authors take notice of three species of gonorrhoeas ; the first is a simple gonorrhoea, or perpetual efflux of the seminal juices, without any virulence : the second is a venereal, or virulent gonorrhoea, so called, though improperly, from its similitude to the preceding : the third is an involuntary efflux of a viscid white, or whitish fluid from the urethra, in consequence of a venereal gonorrhoea ill cured, or too frequently repeated. The first species of this disorder arises from a want of a due tone in the solid parts, and by a preternatural relaxation of the vessels containing the seed, and of the parts adjacent to them. See **GLEET**. This gonorrhoea is either mild or benign, or of a malignant kind. The latter consists in a discharge of matter of various colours, accompanied with heat and exulceration ; and in scorbutic, or cacochymic patients, as also those afflicted with the stone, this disorder is generally attended with a pain in discharging the urine, which in such patients is of an acrimonious quality : but in a gonorrhoea of a mild or a benign kind, a whitish liquor all of one colour, is discharged without pain, heat, or exulceration ; and frequently proceeds from a redundancy of the seminal fluid, arising from high living in an unmarried state, or its acrimony in cacochymic, scorbutic, or arthritic patients, as well as from the weakness of, and want of due tone in the femal vessels. The cure of a benign gonorrhoea is highly difficult ; nor can any other reason be assigned for this disorder, than that there is a preternatural efflux of impure humours from all parts of the body to those parts infected, which are already too much weakened, and have their tone destroyed. Besides, the parts subservient to generation, which are in this disorder affected, consist entirely of nerves and nervous coats ; and it is not without the greatest difficulty that the energy of medicines penetrates to them. In the cure, the following intentions are to be pursued. First, the redundancy of impure serum, if there are any such in the body, is, by means of proper laxatives, to be evacuated and derived from the parts affected. Then the too much relaxed and flaccid parts are to be strengthened by proper corroborating medicines, both of the external

ternal and internal kind. The former of these intentions is answered by such laxatives as operate in a double manner, such as the pilulæ balsamicæ of Becher, which are not only purgative, but highly corroborating. To answer the other intention, the following powder must be used. Take of cuttle-bone, one ounce; of red coral, amber, the species of hyacinth, and the bark of cascarilla, each two drams; make into a powder, one dram of which is to be taken every morning and evening in a decoction of barley, prepared with some almonds. At the same time the following epithem may be applied to the region of the pubes and perinæum, especially during the nighttime. Take of herbs, baum, mint, and basil; of the leaves of red roses, and balaustins, each one handful; of pomgranate-bark, cloves, nutmegs, cardamoms, and mastich, each half an ounce: mix together, and put into a small bag to be boiled in red French wine. These measures are to be seconded by an accurate regimen, being chiefly such as is prescribed below for the virulent gonorrhœa. In the cure of a malignant gonorrhœa, regard is to be had to the constitution of the patient: when he is hot, and of a delicate constitution, he ought, especially in the beginning of the distemper, to abstain from hot substances, purgatives, sudorifics, diuretics, &c. The following preparation may be frequently exhibited in this disorder. Take of mint, three handfuls; of venice turpentine, one ounce; of peruvian balsam, half an ounce: distil with three pints of rhenish wine. The dose is from one to two ounces: and the following may be used as a succedaneum. Take of rose-water, and rectified spirit of wine, each half a pint; and of the balsam of life, fifty drops. Mix all together.

A virulent gonorrhœa, or clap, being the second species of this disorder, proceeds from impure coition with an infected person.

This distemper begins, and makes its progress, in the following manner.

The patient, sooner or later, according as the person with whom he has had conversation, was more or less infected, and according to his constitution, by which he may be more or less disposed to receive the infection, is first seized with an unusual pain in the genitals; and a kind of sensation like a rotation of

his testicles. Afterwards, if the prepuce constantly covers his glands, there appears an eruption, or pustule, which, by its size, colour and figure, resembles a spot of the measles. Presently after appears a weeping matter like semen, which daily changes colour, and becomes more purulent, and more yellow, till, at length, if the disorder be highly virulent, it assumes a greenish hue, or appears like a thin sanious matter, mixt with blood. The pustule at length becomes an ulcer, called a shanker. See SHANKER.

Those whose glans is uncovered, seldom have such a pustule, and are less liable to imbibe the infection. The running brings on a heat, or smarting in making water, which is most violent, when it is over, for then it seems to burn the whole duct of the urethra.

Another symptom is the corde, or contraction of the frænum, by which the penis is bent downwards. There is likewise, when the penis is erected, great pain, as if compressed transversely with a strong hand. This chiefly happens in the night, when the patient is warm in bed: sometimes the urethra being eaten, and excoriated with long running: of acrimonious pus, nature breeds a soft spongy flesh, to supply the defect, which daily increasing, forms caruncles, or carnosities so far as to plug up the urinary passage, and stop up the urine. However, the little adjoining ulcers continue to pour forth a kind of an ichor. It also happens, through some violent motion, or the ill timed use of astringents, that the sanies, which should be carried off by the gonorrhœa, is translated to the scrotum, and causes one or both of the testicles to swell, and inflame with intolerable pain: the running at the same time decreasing, while the scalding of the urine is as great as ever.

To these symptoms may be added the phimosis, and the paraphimosis. There are also sometimes watery bladders, called crystallines, and at length buboes of the glands in the groin. See PHIMOSIS, PARAPHIMOSIS, BUBO, and POX.

Women are not so subject to such a variety of symptoms as men: their chief complaint being a difficulty of urine, and a running; however, they are liable to shankers and venereal warts, as well within as on the outward parts of the labia pudendi; as also to buboes in the groin: as for the coarctation of the

sphincter vaginae, purring as it were the external orifice, this is not a phimosis, though by some improperly so called.

This disorder proceeding from an infection of a malignant gonorrhoea, or the lues venerea, is first conveyed to the genitals, and afterwards thro' the pores to the lymph, or feminal liquor; the due crasis and natural mixture of which it destroys, by inducing partly a caustic and corroding, and partly a putrid state thereof: hence arise the pains, the heats, the tumours, the inflammations, and the exulcerations of the genitals. For at first the glans only is infected whilst in coition, the poison insinuating itself into the pores; after which, it soon proceeds to the glands of the urethra, then to the prostate, and afterwards to the vesiculæ seminales. The regimen, during the time of the cure, according to Boerhaave, requires the patient to abstain from all oily food; and he must also avoid every thing, which by its acrimonious quality stimulates to venery; such as spices, bulbous roots, flesh, eggs, fish, and fermented liquors: for as the inflation of the penis retards the cure, it is of the utmost consequence to be avoided; as are also every thing else that inflames the fancy, or provokes to venery, as amorous dalliance with women, &c. Water and whey are the best drinks; and seeds and summer fruits the best aliment. All possible care must be taken that cold never reach the penis, and that it be kept always moist, lest the pores contracting repel the flux of matter. An emollient and somewhat antiseptic cataplasm will be beneficial. In the cure, Sydenham's method of purging the patient till the symptoms were abated is now justly laid aside. Turner's last method, which he made use of himself, is as follows: Take two drachms of quicksilver; one drachm of gum guaiacum; and beat them, together with a little spirit of lemon, till the globules of the mercury disappear: afterwards add half a drachm of the pills of colocynth with aloes: beat it into a mass; of which make up twenty-four pills. Two of these pills containing half a scruple of the mercury, may be taken night and morning; or according to the operation; one only for a week or ten days, unless the patient complains of his gums, or a sore mouth: for then the mercury must be left out.

If the cordee does not remit, a scruple of sal prunella may be taken, with as much fine sugar between whites, in a draught of the following apozem: Take of mercurial water two pounds; of the solution of gum arabic, and syrup of marshmallows, of each one ounce; make it into an apozem, or decoction. The mercurial water is common river-water, in two quarts of which four ounces of quicksilver have been boiled to a quart. The patient may drink of the apozem through the whole course.

And now, as there is occasion, the pills are continued for a week, or ten days more, but at night only; and in the morning is given the quantity of a nutmeg of the following electuary: Take virgin-honey, an ounce and a half; balsam of capivi, six drachms; powder of the root of jalap, and sal prunella, of each one drachm, which make into an electuary. The patient must drink a draught of the apozem as well after the electuary as after the pill. See the article ELECTUARY.

There is no danger of the running being stopt while his body is kept open by these means; but when the quantity grows less, and the colour whiter, and feels more tenacious, the pill is laid aside, and the electuary kept to some days longer, night and morning. If it purges too much, the jalap is left out, and the rhubarb substituted instead thereof. When it proves tedious, boiled turpentine is given by way of farther agglutinating, and drying the gleet. See the article GLEET.

When the cordee and dysury are very stubborn, or the running more virulent than ordinary, the genitals are to be smeared every night quite up to the groin, with the weaker blue ointment, and the pill without the quicksilver is given early in the morning in a large dose, or a draught of the infusion of senna. This method will succeed in three weeks, or a month's time, if the patient is governable.

In the place of mercurials given internally, Astruc directs the use of crude quicksilver, as in the common unction to be rubbed upon the parts, as about the body of the penis, especially under the urethra, to the perinaeum, and so on to the pubes and testicles, by which the mercury, insinuating itself through the pores into the lymphatic vessels,

instantly



instantly conveyed into the glandules and subdues the poison lodged therein, taking away all the symptoms without any disturbance to the *primæ viæ*, the stomach and guts.

If there is no discharge from the penis of any virulent matter, it is called the gonorrhœa sicca, or dry clap; the symptoms of which are a dysury, or difficulty of making water, and after, from the increase of the inflammation and tumefaction, an ischury, or total suppression of urine. See the articles DYSURY, and ISCHURY.

In the cure of the dry clap, Astruc advises plentiful bleeding in the beginning, to take off the tension, and to abate the inflammation; as also emollient decoctions of mallows, linseed, &c. in milk, to foment the parts: but perhaps it might be better to make a pulice of these ingredients, after Boerhaave's method, to lay to the parts affected; or, which is best of all, to use them one after the other.

Astruc advises also lenient clysters, cooling emulsions, and pilsans, with sal prunella and anodynes, between whiles. During the continuance of the inflammation, no mercurials must be used, and if the symptoms increase, threatening an abscess in the perinæum, it is to be forwarded as much as possible, by suppurative pulices, and the matter discharged.

The symptoms of this disease being all separately treated of under their several heads, for the cure and method of treating each, see the articles TUMOUR, BUBO, CARUNCLE, GLEET, SHANKER, PHIMOSIS, PARAPHIMOSIS, CRYSTALLINE, PORRI, CONDYLOMATA, CRISTÆ, &c.

When the gonorrhœa has continued a long while, or long enough for the poisonous matter to make its way into the blood; or by astringents given unseasonably it cannot make its exit; then the patient is infected with the pox. See the article POX.

The third species of this disorder requires the very same treatment with the simple and virulent: but here the least time must not be lost; the affected part must be kept in a constant state of laxity, by the most emollient applications; and the contagious matter must with all possible expedition be drawn out: for the whole cure depends upon the total discharge of the infectious matter, together with the pus, which it has introduced; and if this task is not performed,

a pox is greatly to be apprehended. Wherefore, if this disease continues but for a little time, recourse must be had to all the severities of a salivation. For though salivating does not at all cure either of the two former kinds of gonorrhœa, this species of the disease, having its seat in the glandulæ cowperianæ of the urethra, so that the pus discharges itself by their excretory duct into the urinary duct, is much more susceptible of the power of mercury.

GONALGIA, a term of much the same import with gonagra. See GONAGRA.

GOOD, in general, whatever is apt to cause or increase pleasure, or diminish pain in us; or, which amounts to the same, whatever is able to procure, or preserve to us the possession of agreeable sensations, and remove those of an opposite nature.

By pleasure and pain, says Mr. Locke, I would be understood to mean of body or mind, as they are commonly distinguished; though, in truth, they are only different constitutions of the mind, sometimes occasioned by a disorder in the body, and sometimes by thoughts of the mind. Pleasure and pain, and their causes good and evil, are the hinges upon which our passions turn; so that by reflecting on the various modifications or tempers of mind, and the intestine sensations which pleasure and pain, good and evil, produce in us, we may thence form to ourselves the ideas of our passions. See PASSION, HAPPINESS, &c.

Metaphysical GOOD, the same with perfection. See PERFECTION.

Moral GOOD, denotes the right conduct of the several senses and passions, or their just proportion and accommodation to their respective objects and relations.

The same principle, or law of our natures, which determines us to pursue any one end, or species of good, prompts us to pursue every other end, or species of good of which we are susceptible, or to which our Maker has given us an original propension. But amidst the great multiplicity of ends or goods, which form the various ingredients of our happiness, we perceive an evident gradation, or subordination; and in the accommodation of our actions thereto, consists their moral goodness. Thus, the goods of the body, or of the external senses, seem to hold the lowest rank in this gradation or scale of goods. These we have in common with brutes; and

when, at any time, they come in competition with goods of a higher order, the unanimous verdict of mankind gives the preference to these last. Next to sensual goods come those arising from social connections, as fame, fortune, power, civil authority, and the like, which are chiefly valuable, as being the means of procuring natural or moral good, but principally the latter. Goods of the understanding are still superior, as taste, knowledge, memory, judgment, &c. And the highest are the moral goods of the mind, directly and ultimately regarding ourselves, as command of the appetites and passions, prudence, fortitude, benevolence, &c. These are the principal ingredients of our happiness.

Moral good is of so singular and sublime a nature, that when the mind is in pursuit of it, though it should prove unsuccessful in its aims, it can rest in the conduct without repining, or being dejected at the ill success: nay, the pleasure attending the consciousness of upright aims, and generous efforts, absorbs the disappointment, and makes inferior ends disappear, as of no amount in the great aggregate or surplussage that remains. See the article HAPPINESS.

**GOOD BEARING**, in law, denotes much the same with good behaviour.

**GOOD BEHAVIOUR**, in law, an exact carriage and behaviour to the king and his people.

A justice of peace may, at the request of another, or where he himself sees cause, demand surety for the good behaviour; and to that end the justice may issue out his warrant against any persons whatsoever, under the degree of nobility; but when it is a nobleman, complaint is to be made in the court of chancery, or king's bench, where such nobleman may be bound to keep the peace. Infants and feme-coverts, who ought to find surety by their friends, may be bound over to their good behaviour; as also lunatics, that have sometimes lucid intervals, and all others who break the peace, or being suspected to do it, by affrays, assaults, battery, wounding, fighting, quarrelling, threatening, &c. A person may be likewise bound to his good behaviour for a scandalous way of living, keeping bawdy-houses, gaming-houses, &c. and so may common drunkards, whoremongers, common whores, cheats, libellers, &c. He who demands

surety for the peace, on any violence offered, must take an oath before the justice, that he goes in fear of his life, or some bodily harm, &c. and that it is not out of malice, but from a regard to his own safety.

**GOODS, bona**, in law, the same with chattels. See the article CHATTELS.

**GOODS**, among distillers, a term for spirits of any kind. See the article SPIRITS.

*Alloting of GOODS.* See ALLOTING.

*Consignment of GOODS.* See the article CONSIGNMENT.

*Running, &c. of GOODS.* See RUNNING, &c.

**GOOD-HOPE**, or *Cape of GOOD HOPE*, the most southern promontory of Africa, where the Dutch have built a good town and fort: east long. 16° and south lat. 34° 15'.

**GOOLE**, in law-books, signifies a breach in a sea bank, or wall.

**GOOSE**, *anser*, in ornithology, a well-known bird of the anas-kind, with the back of a greyish brown colour, the belly and edges of the wing-feathers white.

Geese are fowls of great profit, both for food, for their feathers, and for their grease. For the gathering of their feathers, some authors advise their being pulled twice a year, *viz.* in March and August; yet this is certainly an unprofitable as well as a cruel practice; for the goose on being incapable of flight, easily falls a prey to the fox, and other ravenous creatures, and by uncloathing her, you occasion her getting cold, which suddenly kills her. 'Tis therefore, most adviseable to stay till moulting time, or till you kill her, and then all her feathers may be made use of at pleasure.

**GOOSE-BERRY**, *grossularia*, or *ribes*, in botany. See the article RIBES.

The best way of raising these useful bushes is by cuttings, observing always to take the handsofshoots, and that from branches that bear most fruit. These are to be planted in February. See the article CUTTINGS.

There are a great many sorts of gooseberry, among which the white holland kind is the fairest, and best bearer of all others; the berries being large, transparent, and well tasted. The english yellow gooseberry is known every where, and fittest for culinary uses while green. The hedge-hog gooseberry is large, well-tasted, and extremely hairy. There is also a sort of green gooseberry, that is a very pleasant fruit,

Goose-

**Goose-berries** taken in season, produce a delicious wine, very proper for summer repasts. Also, if thoroughly pressed, with an addition of water, and well fermented, they yield in distillation the best brandy of any of our fruits, and little inferior to french brandy.

**GOOSE-DUNG**, in agriculture. See the article **DUNG**.

**GOOSE-NECK**, in a ship, a piece of iron fixed on the end of the tiller, to which the laniard of the whip-staff, or the wheel rope comes, for steering the ship.

**GOOSE-WING**, in the sea-language. When a ship sails before, or with, a quarter-wind on a fresh gale, to make the more haste, they launch out a boom, and sail on the lee-side; and a sail so fitted, is called a goose-wing.

**GOR**, the capital of a province of the same name, in the East-Indies, subject to the Mogul: east long.  $85^{\circ}$ , north lat.  $31^{\circ} 15'$ .

**GORCE**, in law-books, denotes a kind of wear. See the article **WEAR**.

**GOR-COCK**, a bird, otherwise called a moor-cock. See **MOOR-COCK**.

**GORCUM**, a city of the United Provinces, situated in that of Holland, on the river Waal, twenty-two miles east of Rotterdam: east long.  $4^{\circ} 50'$ , north lat.  $51^{\circ} 50'$ .

**GORDIAN KNOT**, in antiquity, a knot made in the leathers or harness of the chariot of Gordius, king of Phrygia, so very intricate, that there was no finding where it began or ended.

The inhabitants had a tradition, that the oracle had declared, that he who untied this knot, should be master of Asia. Alexander having undertaken it, was unable to accomplish it, when fearing lest his not untying it should be deemed an ill augury, and prove a check in the way of his conquests, he cut it asunder with his sword, and thus either accomplished, or eluded the oracle.

**GORE**, in heraldry, one of the abatements, which, according to Guillim, denotes a coward. It is a figure consisting of two arch lines drawn one from the sinister chief, and the other from the sinister base, both meeting in an acute angle in the middle of the fess point. See plate **CXI**. fig. 4.

**GORE**, in law, signifies a narrow slip of ground.

**GOREING**, in the sea-language, sloping. A sail is cut goreing, when it is cut sloping by degrees, and is broader at the

clew than at the earing, as all topmasts and top-gallant sails are.

**GOREL**, the title of the prince of Georgia, in Asia. See **GEORGIA**.

**GORGE**, *gula*, in architecture, the narrowest part of the tuscan and doric capitals, lying between the astragal, above the shaft of the pillar and the annulets. See **TUSCAN** and **DORIC**.

It is also used for a concave moulding, larger, but not so deep as a scotia, which serves for compartments, &c. See the article **COMPARTMENT**.

**GORGE**, in fortification, the entrance of the platform of any work.

In all the out-works, the gorge is the interval betwixt the wings on the side of the great ditch, as the gorge of a ravelin, half-moon, &c. These, it is to be observed, are all destitute of parapets; because, if there were any, the besiegers, having taken possession of the work, might use it to defend themselves from the shot of the place; which is the reason, that they are only fortified with palisades, to prevent a surprize.

The gorge of a bastion is nothing else but the prolongation of the curtains from their angle with the flanks, to the center of the bastion where they meet. When the bastion is flat, the gorge is a right line, which terminates the distance between the two flanks. See the articles **BASTION** and **FORTIFICATION**.

**GORGED**, in heraldry, the bearing of a crown, coronet, or the like, about the neck of a lion, a swan, &c. and in that case it is said, the lion or cygnet is gorged with a ducal coronet, &c.

Gorged is also used when the gorge, or neck of a peacock, swan, or the like bird, is of a different colour or metal, from the rest.

**GORGED**, among farriers, &c. signifies the same as swelled; in which sense they say, the legs of a horse are gorged; the paster joint is gorged; you must walk him out to disgorge his shoulder.

**GORGERIN**, in architecture, the same with gorge. See the article **GORGE**.

**GORGONA**, the name of two islands, one in the pacific ocean on the coast of Peru: west long.  $79^{\circ}$ , north lat.  $3^{\circ}$ ; the other in the Mediterranean, twenty-five miles west of Leghorn.

**GORGONIUM**, in botany, a name sometimes given to eryngium. See the article **ERYNGIUM**.

**GORGONS**, in antiquity, a warlike female nation of Lybia, in Africa, who had

had frequent quarrels with another nation of the same sex, called Amazons.

**GORITIA**, or **GORITZ**, a town of Carniola, in Austria, near the confines of the territories of Venice: east long.  $14^{\circ}$ , north lat.  $46^{\circ} 20'$ .

**GORLITZ**, a city of Upper Saxony, in Germany, fifty miles east of Dresden: east long.  $15^{\circ} 6'$ , north lat.  $51^{\circ} 12'$ .

**GOSHAWK**, the english name of the yellow-legged falcon, with a brown back, and a white variegated breast. See the article **FALCON**.

It is a large and very beautiful bird, which preys upon the pheasant, mallard, wild goose, hare, and coney, and will even venture to seize on a kid or goat. She ought to be kept with great care, as being very choice and dainty.

**GOSLAR**, an imperial city of Lower Saxony, in Germany, thirty miles south of Brunswick: east long.  $10^{\circ} 30'$ , north lat.  $52^{\circ}$ .

**GOSPEL**, the history of the life, actions, death, resurrection, ascension and doctrine of Jesus Christ.

The word is saxon, and of the same import with the latin term *evangelium*, or the greek *εὐαγγέλιον*, which signifies glad tidings, or good news; the history of our blessed saviour being the best news ever published to mankind.

This history is contained in the writings of St. Matthew, St. Mark, St. Luke, and St. John; who from thence are called evangelists. The christian church never acknowledged any more than these four gospels as canonical; notwithstanding which, several apocryphal gospels are handed down to us, and others are entirely lost.

The antient fathers endeavoured to find out divers mysteries in there being but four genuine canonical gospels. St. Jerom, in particular, says, that as there are four parts of the world, and four principal winds, it was also proper there should be four gospels in the church, as four columns to support it, and four breathings of life to render it immortal. They thought they found the figure of the four evangelists in the beginning of the prophecy of Ezekiel, and in the ninth chapter of the Revelations, where mention is made of four living creatures, the first having the face of a man; the second of a lion; the third of an ox; and the fourth of an eagle; and for this

reason the evangelists are usually painted with these symbols.

**GOSSYPIMUM**, **COTTON**, in botany, a genus of the *monadelphia-polyandria* class of plants, the flower of which consists of five plane and patent petals, growing together at their bases, and vertically cordated: the fruit is a roundish capsule, containing four cells, with a great number of oval seeds, surrounded with a fine downy matter. See **COTTON**.

**GOSTAVIN**, or **GOSTIVIN**, a town of great Poland: east long.  $20^{\circ}$ , north lat.  $52^{\circ} 45'$ .

**GOTHA**, the capital of the dutchy of Saxe-Gotha, in Upper Saxony; east long.  $10^{\circ} 36'$ , north lat.  $51^{\circ}$ .

It is subject to the duke of Saxe-Gotha, brother of her royal highness the princess dowager of Wales.

**GOTHIC**, in general, whatever has any relation to the Goths: thus, we say gothic customs, gothic architecture, &c. See the article **ARCHITECTURE**.

Gothic architecture is far removed from the manner and proportions of the antique; having its ornaments wild and chimerical, and its profiles incorrect. However, it is frequently found very strong, and appears very rich and pompous, as may be seen in several of our english cathedrals. This manner of building was, originally, very heavy and coarse; but is since run into the opposite extreme, being slender, rich, and delicate to a fault. In the gothic architecture, we see high vaults raised on slender pillars; and every thing crowded with windows, roses, crosses, figures, &c.

**GOTHIC CHARACTER**, or **LETTER**. See the article **LETTER**.

**GOTHIC COLUMN**. See **COLUMN**.

**GOTHLAND**, the most southern province of Sweden, being a peninsula surrounded on three sides by the Baltic Sea. It is subdivided into east and west Gothland, Smaland, Halland, Bleken and Schonen.

**GOTHLAND**, is also an island of the Baltic, situated between the province of Gothland and Livonia.

**GOTTENBURG**, a port-town of Sweden, situated without the Sound, on the coast of the Schaggerack Sea, near the entrance of the Baltic.

**GOTTINGEN**, a city of Germany, in the circle of Lower Saxony, and dukedom of Brunswick: east long.  $9^{\circ} 45'$ , north lat.  $51^{\circ} 32'$ .

**GOTTORP**,

**GOTTORP**, a city of the dukedom of Sleswic, in Denmark, and capital of the territories of the duke of Holstein-Gottorp : east long.  $10^{\circ}$ , north lat  $54^{\circ} 40'$ .

**GOUDE**, a city of the united Netherlands, in the province of Holland, ten miles north-east of Rotterdam.

**GOUDHURST**, a market-town of Kent, nine miles south-west of Maidstone.

**GOVERNMENT**, in general, is the polity of a state, or an orderly power constituted for the public good.

Civil government was instituted for the preservation and advancement of men's civil interests, and for the better security of their lives, liberties, and properties. The use and necessity of government is such, that there never was an age or country without some sort of civil authority : but as men are seldom unanimous in the means of attaining their ends, so their difference in opinion in relation to government, has produced a variety of forms of it. To enumerate them, would be to recapitulate the history of the whole earth. But they may, in general, be reduced to one of these heads : either the civil authority is delegated to one or more, or else it is still reserved to the whole body of the people ; whence arises the known distinction of government into monarchy, aristocracy, and democracy. See the articles **ARISTOCRACY**, **DEMOCRACY**, &c.

Mr. Hooker thinks, that the first government was arbitrary, and administered by a single person ; till it was found by experience, that to live by one man's will, was the cause of all men's misery : and this, he concludes, was the original of inventing laws. The Roman, and most of the grecian states, were built upon the republican plan ; but when the Goths, and other northern nations, destroyed the roman empire, and extended their conquests into far distant countries, they established, wherever they came, a mixed form of government. The preservation of this constitution depending upon the ballance between the king, nobility, and people, the legislative power was lodged in these three states, called by different names in different countries ; in the north, diets ; in Spain, cortes ; in France, estates ; and in Britain, parliaments. The excellency of this mixed government, consists in that due poize or ballance between rule and subjection, so justly observed in it, that by the necessary concurrence of the nobility and com-

mons, in the making and repealing all laws, it has the main advantage of an aristocracy, and a democracy, and yet is free from the disadvantages and evils of either of them. This mixed form of government is, however, now driven almost out of Europe, in some parts of which we can hardly find the shadow of liberty left, and in many, there is no more than the name of it remaining. France, Spain, Portugal, Denmark, and part of Germany, were all, an age or two ago, limited monarchies, governed by princes, well advised by parliaments or cortes, and not by the absolute will of one man. But now all their valuable rights and liberties are swallowed up by the arbitrary power of their princes : whilst we in Great Britain have still happily preserved this noble and antient gothic constitution, which all our neighbours once enjoyed. There is such a due ballance of property, power and dominion in our constitution, that, like the antient government of Sparta, it may be called an empire of laws, and not of men ; being the most excellent plan of limited monarchy in the world.

Governments are commonly divided into two classes, arbitrary and free governments ; but there are many different sorts of each. Thus the governments of France and Spain are generally called arbitrary ; tho' they differ as much from the governments of Turkey and other eastern empires, where absolute despotism prevails, as they do from the government of England, and other european nations, where liberty is said to flourish in its fullest perfection.

**GOVERNMENT** is also a post or office which gives a person the power or right to govern or rule over a place, a city, or province, either supremely or by deputation.

**GOVERNMENT** is also used for the city, country, or place to which the power of governing is extended. In France there are thirty-eight governments of provinces independent of each other ; and besides these there are twelve grand governments, which are those of the isle of France, Burgundy, Normandy, Guienne, Brittany, Champaign, Languedoc, Picardy, Dauphiny, Provence, Lyonois, and Orleanois : but these last are only so many classes of governors or governments, contrived for the better and easier regulating the seats, &c. of the many governors, bailiffs, provosts, &c. who are obliged to assist at the general estates.

GOVERN-

**GOVERNMENT**, in grammar, a part of construction usually called regimen. See **CONSTRUCTION** and **REGIMEN**.

**GOVERNOLO**, a town of Italy, ten miles south-east of Mantua.

**GOUGE**, an instrument or tool used by divers artificers; being a sort of round hollow chissel, for cutting holes, channels, grooves, &c. either in wood or stone. See the article **JOINERY**.

**GOURD**, *cucurbita*, in botany. See the article **CUCURBITA**.

Gourd-seeds are of the number of the four greater cold seeds. They are esteemed cooling and diuretic, and are used in emulsions, and some compositions of the shops. They are good in fevers, and in all disorders arising from an acrimony of the blood or humours. Emulsions of these, and the other cold seeds, are anodyne, and are generally used to take off stranguries occasioned by blisters.

We have our gourd-seeds from Holland. They should be chosen large and plump, fresh, and full of pulp, and of a good taste.

**Bitter GOURD**, a name given to the colocynthis. See the article **COLOCYNTHIS**.

**Indian GOURD**, the same with the crescentia of botanists. See **CRESCENTIA**.

**GOURDY LEGS**, in horses, the disorder otherwise called grease. See **GREASE**.

**GOUST**, or **GOUT**, signifies taste or skill in poetry, painting, &c.

**GOUT**, *arthritis*, in medicine, as defined by Boerhaave, a very painful disease, whose seat is in the joints and ligaments of the feet, and whose principal times of invasion are the spring and autumn.

This disease, according to the forementioned author, seldom invades any patient till he is upwards of thirty; and men are more subject to it than women; as also all persons of acute parts that follow their studies too close, especially in the night-time, with an intense application of mind. Likewise those who live high, and indulge their appetites; drinking plentifully of rich generous wines; or who use acids too freely, or white eager wines; or who have been addicted too early to venereal pleasures; or whose bodies are large, gross, and full. Those are liable to it whose sweaty feet are too suddenly chilled; or who suffer their feet to sweat in wet shoes and stockings. Hence hunting and riding in the cold are pernicious. It may likewise be received by contagion, and is hereditary, descending from father to son.

In treating of this disease we shall, from the authority of Sydenham, first give an account of what that writer calls the regular gout, and afterwards of what he calls the irregular: by the latter is meant a gout which, by the preposterous use of improper medicines, has been turned out of its natural course; or, by reason of the patient's weakness, cannot attain to its proper and genuine symptoms.

The regular gout makes its onset in the following manner. It usually seizes the patient in the latter end of January, or beginning of February, all of a sudden, without any previous notice, unless the patient has been troubled with crudities of the stomach, and indigestion for some weeks before: the body likewise, in many, seems to have been puffed up with wind, with a kind of heaviness, which daily increases, till at length the fit comes thundering on; a few days before which there is a torpor, and, as it were, a descent of wind down the muscles of the thigh, with a kind of spasmodic affection of them. Likewise the day before the fit, the appetite is more voracious, but not natural.

Though the patient seems to go to bed in good health, yet commonly about two in the morning, he is alarmed by a pain which most frequently affects the great toe, sometimes the heel, the ankle, or the calf of the leg, which pain resembles that of dislocated bones: there is likewise a sensation, as if water, almost cold, was poured on the membranes of the part affected. Soon after a shivering and shaking supervene, with a feverish disorder. The pain, which at first was tolerable, becomes more violent, as the shaking decreases, and grows more intense every hour till night; and then it is at the height, settling itself about the little bones of the tarsus and metatarsus, whose ligaments it affects. Now there seems to be a violent extension of the ligaments; or there is a sensation of their being lacerated: sometimes they seem to be pressed or squeezed together. At this time the parts affected become so exceeding sensible, that they cannot bear the weight of the sheet, nor the shaking of the room by a person walking about, unless he threads very softly. This always happens at the accession of the fit. About twenty-four hours after this, the patient perceives the part to be swelled, and the pain much abated.

The next day, or perhaps two or three days

days afterwards, if the gouty matter is copious, the part affected is a little in pain. In a few days, the other foot begins to be affected in the same manner; and if the pain has ceased in the first, the weakness which it left behind soon vanishes: the same tragedy is now acted over again. Sometimes when the gouty matter is in great plenty, it attacks both feet at once, but it generally seizes one after the other.

After both feet have been tormented, the fits which follow are out of rule, both as to the time of invasion and the duration; only the pain grows more intense at night, and remits in the morning. From a series of those small fits arises what is called a fit of the gout, which is longer or shorter, according to the patient's age. This happens to the more vigorous, and whom the gout seldom visits, in fourteen days; to persons advanced in years, who have often felt its rage, two months: but those who are debilitated with age, or the long stay of the disease, it does not leave till summer; which being pretty far advanced, drives it away.

When the fit goes off, there is an intolerable itching in the affected foot, chiefly between the toes, from which, and from the feet, fall branny scales, as if the patient had swallowed poison: the disease thus terminated, the patient's good habit of body and appetite return in proportion to the severity of the pain in the last fit, and in the same proportion the next fit will be either accelerated or retarded: for if the last was very severe, the next will not come on in less time than a solar revolution.

Such is the regular gout and its genuine symptoms: but when it is disturbed by incongruous medicines, and the patient is worn out by the long continuance of the disease, it becomes irregular, and the substance of the body is as it were changed into a fomes of the disease, and nature becomes unequal to the task of conquering the disease thus changed in the accustomed manner.

The feet were at first the seat of the disease, but now it attacks the hands, wrists, elbows, knees, and other parts of the body: sometimes it so distorts the fingers, as to make them resemble a bunch of parsnips; and at length stoney concretions appear about the ligaments of the joints, which breaking through the skin, resemble chalk, or crab's eyes.

Sometimes the gouty matter invades the elbows, and creates a whitish swelling of the size of an egg, which soon assumes a red colour, and becomes inflamed: sometimes it affects the thigh in such a manner, as if a great weight was hung thereon; and yet without any remarkable pain: from thence it descends to the knee, which it attacks more roughly, hindering all motion.

Now the gout afflicts the patient all the year, except for two or three months in summer; and the particular fit which did not last above a day or two, continues ten or fifteen days: the patient is disturbed with sickness as well as pain; his limbs begin to be contracted and unfit for motion; and if he attempts any exercise beyond his strength, the fomes of the disease will attack the viscera in a more dangerous manner.

The curative intention, according to Wrintringham, requires, first, that the primæ viæ be set free from a load of indigested crudities, and the viscera be restored to their pristine vigour; secondly, that the fluid stagnating in, and stuffing up the smaller vessels, may be expelled the body, and a free passage through the contracted vessels be restored.

The first intention may be answered by vomits and gentle cathartics repeated as occasion requires; by bitters, aromatics, antiscorbutic medicines; by alkaline fixed salts, taken in small quantities for a long time; by aliments and drinks that are nourishing, light, easy of digestion, quickly assimilated, and taken in due quantity; by powerful exercise often repeated, and long continued; and especially by riding in a dry, serene, pure air; by frictions; by motion of the affected parts; by going to sleep at early hours.

The second intention may be answered partly by the preceding, as well as by procuring gentle sweats; by bathing in natural and artificial baths; by sweating in a bagnio; or by the use of volatile salts, and copious drinking of attenuating liquors, actually hot, in the morning while in bed, in order to procure a sweat; as also by mercurial purges, taking a large quantity of diluents after them; by frictions of the whole body, especially the parts affected, with hot, dry, linnen-cloths, till a redness appear; by cold baths; and the like.

To abate the excessive pain in the part affected, Boerhaave says, that if there be

an absolute necessity, opiates may be given internally, and the patient may drink plentifully of hot whey, or any other liquor of the like nature. Externally emollients and anodynes may be used, laid on pretty hot; or the part affected may be beat with nettles; or it may be anointed with terebinthinated balsam of sulphur; or tow may be burnt thereon.

Sydenham says, that tho' there is nothing of any moment to be done in the fit; yet that it will be proper to abstain from flesh for some days, and to live on water-gruel, or such-like diet, but no longer than the stomach is averse to flesh, for fear of bringing on a disturbance of the animal spirits: but then great care should be taken in the diet, both as to quantity and quality. See the article DIET.

Dr. Cheyne advises, that as soon as the pain is almost gone, and the swelling and weakness only remain, nothing can be better than warm stomachic and spicey purges, dosed and repeated, according to the strength of the patient. This being premised, if the patient's strength is impaired, and flesh wasted, he advises asses milk with pearl, half a pint or a pint in the morning early, or at five or six o'clock in the afternoon; and to keep up the appetite which the milk commonly palls, and to prevent its cooling effects on the stomach, a light bitter made of gentian, cinnamon, and orange-peel, only the last double to the other two, infused in sherry or white-wine, and taken two hours before meals, may be used most conveniently.

Out of the fit, Sydenham prescribes a medium of diet to be observed; the patient should eat no more than the stomach will digest, nor should he be so abstemious as to defraud the parts of such a proportion of aliments as is necessary to maintain their strength and vigour. As to the quality of the food, the patient's palate is to be consulted, but he should dine upon one dish of meat only; he should, however, not eat any thing that is sharp, salted, or seasoned with spices: he should eat no suppers, but instead thereof drink a draught of good small-beer. The most suitable drink is such as is not so strong as wine, nor so weak as water: of this sort is the London table-beer, or water with a little wine; but when the gouty matter has seized the whole body, he must abstain from all fermented liquors, though ever so mild and

small, and use the following decoction only. Take of the root of sarsaparilla, six ounces; sassafras wood, china root, and the shavings of hartshorn, each two ounces; liquorice root, an ounce; boil them together in two gallons of spring-water for half an hour. Afterwards infuse them upon hot ashes, close covered for twelve hours: then boil them till a third part of the liquor is exhaled, and as soon as it is taken off the fire, infuse therein half an ounce of aniseeds for two hours. Lastly, strain it off and let it rest till it become clear, and put it up into bottles for use.

Regard must likewise be had to the symptoms, which in the fit endanger the patient's life. The most common is a weak and languid stomach, attended with sickness and gripes, as if from wind. In this case nothing is better than a glass of canary drank now and then, together with exercise; but if the symptom will not yield to this, give twenty drops of the thebaic tincture in spirituous alexiterial water, provided the head is not attacked, and let the patient compose himself to rest. If the symptom will not yield to this, sweating is prescribed, as also in a diarrhoea, when laudanum fails: but if there is a translocation of the gouty matter to the lobes of the lungs, and the pain has left the joints, this symptom is to be treated as a peripneumony. See the article PERIPNEUMONY.

If the nephritic pains should come upon the gout, let the patient omit all other medicines, and drink a large quantity of posset-drink, in which the leaves and roots of mallows and marsh-mallows have been boiled. Then let a clyster be given, and afterwards a dose of laudanum. When the gout has seized on the head, Dr. Cheyne orders it to be treated as any other violent head-ach, or an inflammation of the brain and its membranes. In young and strong constitutions, mercurial and antimonial vomits will do wonders; likewise gentle stomach-purges are to be poured down continually, that is two or three spoonfuls every third hour, till the effect is obtained. See the articles HEAD-ACH and VOMIT.

Pitcairn asserts, that the gout may be cured in the same manner as the lues venerea, by a salivation, and a decoction of the woods; and Cheyne allows, that a full and free salivation will cure the gout for several years, but then it shatters the constitution so much, that the future fits be-



come worse for it : but however this is no objection against a common mercurial course, which Dr. James, after repeated trials, has found very efficacious in the cure of the gout, of which the several cases published in his treatise of the gout, are a sufficient testimony.

Cheyne likewise observes, that a dram of powdered sulphur, or flower of brimstone, taken regularly in a spoonful of milk, has prevented the fit for many years. It moves the body gently once or twice a day. Musgrave, to bring the gout back from the noble parts to the joints, had a great opinion of the alcohol martis. See the article ALCOHOL.

If this does not excite a pain in the joints in four or five days, recourse must be had to externals ; such as the cephalic plaster, ceratum viride, or hat-case ; or the parts must be stung with nettles.

De Sault, supposing the gout depends on the want of perspiration, proposes warm baths, exercise, avoiding cold as much as possible, clean linnen and other cloaths, moderate eating, abstinence from suppers, frictions, tranquillity of mind, and a milk diet, as preservatives against it. He recommends garlic in the summer, and steel and the peruvian bark in the winter. When the stomach is attacked, he lets blood at the ancles, and applies epispastics of different kinds to the feet ; and then endeavours to procure a general sweat. When the pain is very violent, he blunts it by applying a cloth dipt in liquid laudanum, and exhorts the patient to ule exercise after this.

Cheyne says, that mercurial vomits are not only proper for the gout in the stomach, but that they are absolutely necessary, as well as the mercurial purges, when the gout becomes fixed to and permanent in a part, as also when it is dispersed all over the habit like a rheumatism ; that these active medicines must first render the humours fluid, which gum guaiac, with diaphorantimony, will afterwards carry off.

GOUT-WORT, in botany, a term sometimes used for angelica. See ANGELICA.

GOUTY-LAND, among farmers, denotes a moorish, cold and black soil, abounding with springs.

In Staffordshire this sort of land is ordered much in the same manner as heathy land, only that it is usually burnt deeper. It bears little but oats, white oats upon the gouty, and black oats upon the black cold land.

The turf of these grounds burnt, and carried upon rye or barley-lands, is esteemed a better improvement than dung. See the article HEATHY LAND.

GOWN, *toga*, a well known garment, worn by divines, lawyers, &c. who are therefore called gown-men, or gentlemen of the gown.

The citizens of antient Rome all wore gowns, *togæ* ; whence the appellation given them of *gens togata*. See the articles TOGA, PRÆTEXTA, &c.

GRABATARII, in church-history, a name antiently given to persons who deferred receiving of baptism, till on their death-bed.

GRABOW, or GRUBOW, a town of Lower Saxony, and dutchy of Mecklenburg : east longitude  $11^{\circ} 36'$ , north lat.  $53^{\circ} 32'$ .

GRACE, *gratia*, among divines, signifies any unmerited gift which God bestows on mankind.

Divines distinguish grace into habitual and actual : the first resides stably in us, is fixed in the soul, and remains till it is expunged by some grievous wilful sin. This is also called justifying grace, as it makes us appear innocent and righteous in the sight of God ; and sanctifying grace, as it makes us holy and devoted to God. Actual grace is that which God gives us for the special performance of some particular good thing, as to convert us, to enable us to resist a particular temptation, &c.

Grace is also divided into natural and supernatural : the natural including the gifts of being, life, of rational faculties, an immortal soul, &c. and the supernatural, is considered as a gift conferred on intelligent beings in order to their salvation.

GRACE, in geography, a city of Provence, in France, fifteen miles south-west of Nice : east long.  $6^{\circ} 50'$ , north lat.  $43^{\circ} 40'$ .

ACT of GRACE, an act of parliament for a general and free pardon, and for setting at liberty insolvent debtors.

DAYS of GRACE, in commerce. See DAY.

GRACE is also a title of dignity given to dukes, archbishops, and in Germany, to barons and other inferior princes.

GRACE of God, or By the GRACE of God, a formula used by sovereign princes, to express their independence. Thus in speaking of his britannic majesty, the formula runs thus : " George, by the " grace of God, king of Great Britain, " &c."

**GRACES**, *gratiae*, among canonists, the same with provisions. See **PROVISION**.

**GRACES**, in heathen mythology, three goddesses, whose names were Aglia, Thalia, and Euphrosyne; that is, shining, flourishing, and gay; or according to some authors; Palitheia, Euphrosyne, and Ægiale. Some make them the daughters of Jupiter, and Eurynome, or Eunomia, the daughter of Oceanus; but the most common opinion is, that they were the daughters of Bacchus and Venus.

They are sometimes represented dressed, but more frequently naked, to shew, perhaps, that whatever is truly graceful, is so in itself, without the aid of exterior ornaments. They presided over mutual kindness and acknowledgment; bestowed liberality, eloquence, and wisdom, together with a good grace, gaiety of disposition, and easiness of manners.

**GRACILIS**, in anatomy, a muscle of the leg, so called from its slenderness: it arises from the symphondrosis of the os pubis.

**GRACULUS**, the JACKDAW, in ornithology, a species of corvus. See the articles **CORVUS** and **JACKDAW**.

**GRACULUS PALMIFES**, a species of pelican, called in english the shag. See **SHAG**.

**GRADATION**, in general, the ascending step by step, or in a regular and uniform manner.

**GRADATION**, in architecture, a flight of steps, particularly in ascending from the cloister to the choir, in churches.

It also denotes an artful disposition of several parts, as it were by steps and degrees, after the manner of an amphitheatre; so that those placed before, are rather serviceable than the contrary, to those behind.

**GRADATION**, in logic, a form of reasoning, otherwise called sorites. See the article **SORITES**.

**GRADATION**, in painting, a gradual and insensible change of colour, by the diminution of the tints and shades.

**GRADATION**, in rhetoric, the same with CLIMAX. See the article **CLIMAX**.

**GRADISKA**, a city of Slavonia, situated on the river Save, twenty-five miles west of Zolga: east long. 18°, north lat. 46° 33'.

**GRADO**, in the italian music, the same with degree. See the articles **DEGREE** and **CONJOINT**.

**GRADO**, in geography, an island of the Adriatic sea, thirty-five miles north-east of Venice.

**GRADUAL**, *graduale*, in ecclesiastical writers, a book containing prayers to be used after the epistle.

The romanists still give the name gradual to a verse sung after the epistle.

**GRADUAL PSALMS**. See **PSALMS**.

**GRADUATE**, a person who has taken a degree in the university. See **DEGREE**.

**GRADUATION**, in mathematics, the act of graduating or dividing any thing into degrees, or equal parts.

**GRADUS**, a degree. See **DEGREE**.

**GRAFFER**, a term met with in law-books, signifying a notary or scrivener.

**GRAFFIUM**, a term also found in law-books, for a register or chartulary of deeds and other evidences.

**GRAFT**, or **GRAFF**, in gardening, a cion or shoot of a tree inserted into another, so as to make it yield fruit of the same nature with that of the tree from whence the graft was taken.

In the choice of grafts, the following directions should be carefully observed:

1st. That they are shoots of the former year. 2dly. That they are taken from healthy fruitful trees. And, 3dly. That you prefer those grafts which are taken from the lateral or horizontal branches, to those taken from the perpendicular shoots. These grafts should be cut off from the trees before the buds begin to swell, which is generally three weeks or a month before the season for grafting; therefore when they are cut off, they should be laid in the ground with the cut downwards, burying them half their length, and covering their tops with dry litter, to prevent their drying: if a small joint of the former year's wood be cut off with the cion, it will preserve it the better; and when it is grafted, this may be cut off; for the grafts must be cut to a proper length before they are inserted into the stocks; but till then, the shoots should remain their full length, as they were taken from the tree, which will preserve them better from striking. If these grafts are to be carried to a considerable distance, it will be proper to put their cut ends into a lump of clay, and to wrap them up in moss, which will preserve them fresh for a month or longer: but these should be cut off earlier from the trees, than those which are to be grafted near the place where the trees are growing. For the choice of stocks for grafting, see the article **STOCK**.

**GRAFTING**, or **ENGRAFTING**, is the taking a shoot from one tree, and insert-

[ ing it into another ; in such a manner, as that both may unite and become one tree. See GRAFT, *supra*.

The use of grafting is to propagate any curious sorts of fruit, so as to be certain of the kinds ; which cannot be done by any other method : for as all the good fruit have been actually obtained from seeds, the seeds of these, when sown, will, many of them, degenerate, and produce such fruit as are not worth cultivating : but when shoots are taken from such trees as produce good fruit, these will never alter from their kind, whatever be the stock or tree on which they are grafted ; for tho' the grafts receive their nourishment from the stocks, yet they are never altered by them, but continue to produce the same kind of fruit as the tree from which they were taken.

*General directions for GRAFTING.* All such trees as are of the same genus, *i. e.* which agree in their flower and fruit, will take upon each other ; for instance, all nut-bearing trees may be safely grafted on each other ; as may also the plum-bearing trees, under which head I reckon not only the several sorts of plums, but also the almond, peach, nectarine, apricot, &c. which agree exactly in their general characters by which they are distinguished from all other trees : but many of these are very subject to emit large quantities of gum from such parts of the trees as are deeply cut and wounded, which, in the tender trees of this kind, *viz.* peaches and nectarines, being more common and hurtful, it is found to be the surest method to bud or inoculate them. See INOCULATION.

All such trees as bear cones will do well upon each other, tho' they may differ in one being ever-green, and the other shedding its leaves in winter ; as is observable in the cedar of Libanus, and the larch-tree, which are found to succeed upon each other very well : but these must be grafted by approach ; for they abound with a great quantity of resin, which is apt to evaporate from the graft, if separated from the tree before it be joined with the stock, whereby they are often destroyed ; as also the laurel on the cherry, or the cherry on the laurel. All the mast-bearing trees will also take upon each other, and those which have a tender soft wood, will do well if grafted in the common way ; but those of a more

firm contexture, and that are slow growers, should be grafted by approach.

By strictly observing this rule we shall seldom miscarry, provided the operation be rightly performed and at a proper season, unless the weather should prove very bad. It is by this method that many kinds of exotic trees are not only propagated, but also rendered hardy enough to endure the cold of our climate in the open air ; for being grafted upon stocks of the same sort that are hardy, the grafts are rendered more capable of enduring the cold ; as has been experienced in most of our valuable fruits now in England, which were formerly transplanted hither from more southerly climates.

*Methods of GRAFTING.* We shall now give the methods of grafting, only first observing, that before the operation is begun, the following tools and materials ought to be provided, *viz.* a small hand-saw, to cut off the heads of large stocks ; a good strong knife with a thick back, to make clefts in the stocks ; a sharp pen-knife to cut the grafts ; a grafting chisel, and a small mallet ; bafs strings or woollen yarn ; and a quantity of clay, which should be prepared a month before it is used, in the following manner : get some strong, fat loam ; then take some new stone-horse dung, and break it in amongst the loam ; if you cut a little straw or hay very small, and mix amongst it, the loam will hold together the better ; and if there be a quantity of salt added, it will prevent the clay from dividing in dry weather ; this compound should be well stirred together, and water put to it in the manner of making mortar ; after which it should be moistened afresh, and stirred every other day ; but it ought to be remembered, that it should not be exposed to the frosts, or to drying winds. Of late years, some have made use of another composition for grafting, which they have found to answer the intention of keeping out the air, better than the clay just prescribed. This is composed of turpentine, bees-wax, and rosin, melted together, which when of a proper consistence, may be put on the stock round the graft, in the same manner as the clay is usually applied ; and tho' it be not above a quarter of an inch thick, yet it will keep out the air more effectually than the clay ; and as cold will harden it,

it, there is no danger of its being hurt by froit, which is very apt to caule the clay to cleave and sometimes fall off; and when the heat of summer comes on, this-mixture will melt and fall off without any trouble; but you must be careful not to apply it too hot, lest you injure the grait.

There are several ways of grafting, the principal of which are the following.

**GRAFTING in the rind**, also called crown-grafting, and shoulder-grafting, is only proper for large trees, where either the head or the large branches are cut off horizontally, and two or four cions put in, according to the size of the branch or stem: in doing of this the cions are cut flat on one side, with a shoulder to rest upon the crown of the stock; then the rind of the stock must be raised up, to admit the cion to enter about two inches between the wood and the bark of the stock, so as the shoulder of the cion may meet, and closely join the crown of the stock; and after the number of cions are inserted, the whole crown of the stock should be well clayed over, leaving two eyes of the cions uncovered. This method of grafting was formerly much more in practice than it is at present: its discontinuance was occasioned by the ill success with which it has been attended, from the cions being frequently blown out by strong winds, after they had made large shoots; which has sometimes happened after they have had five or six years growth; so that whenever this method is practised, there should be stakes fastened to support the cions, till they have almost covered the stock. This method of grafting is generally performed about the latter end of March, or the beginning of April.

**Cleft-GRAFTING**, also termed stock or slit-grafting, is practised upon stocks or trees of a smaller size, from an inch to two inches or more in diameter, and may be used with success where the rind of the stock is not too thick. This method of grafting is to be performed in the months of February and March; and in doing it, the head of the stock or branch must be cut off with a slope, and a slit made the contrary way in the top of the slope, deep enough to receive the cion, which should be cut sloping like a wedge, so as to fit the slit made in the stock, being careful to leave that side of the wedge which is to be placed outward, much

thicker than the other; and in putting the cion into the slit of the stock, great care must be taken to join the rind of the cion to that of the stock; for if these do not unite, the grafts will not succeed: when this method of grafting is used to stocks which are not strong, it will be proper to make a ligature of bals to prevent the slit of the stock from opening; then the whole should be clayed over, to prevent the air from penetrating the slit, so as to destroy the grafts; only leaving two eyes of the cions above the clay for shooting.

**Whip-GRAFTING**, also called tongue-grafting, is most commonly practised of any by the nurserymen near London, especially for small stocks; because the cions much sooner cover the stocks in this method than in any other. This is performed by cutting off the heads of the stocks sloping; there must then be a notch made in the slope toward the upper part downwards, a little more than half an inch deep, to receive the cion, which must be cut with a slope upward, and a part left in this slope like a tongue; which tongue must be inserted into the slit made in the slope of the stock, so as that the two rinds of both cion and stock may be equal and join together exactly; then there should be a ligature of bals to fasten the cion, so as that it may not be easily displaced; and afterwards clay it over, as in the former methods.

**Root-GRAFTING**, consists in grafting a fine fruitful branch upon a root. The manner of performing it, is to take a graft of the tree you design to propagate, and a small piece of the root of another tree of the same kind, or very near it, or pieces of roots cut from such tree as you transplant, and whip-graft them, binding them well together. This tree may be planted where you would have it stand, for the piece of root will draw sap and feed the graft, as the stock does in the other methods.

**GRAFTING by approach**. See **INARCHING**.  
**Escutcheon GRAFTING**. See the article **INOCULATION**.

**GRAIES**, a market-town of Essex, situated on the river Thames, seventeen miles east of London.

**GRAIL**, the same with gradual. See the article **GRADUAL**.

**GRAIN**, all sorts of corn, as wheat, barley, oats, rye, &c. See the articles **CORN**, **WHEAT**, &c.

**GRAIN** is also the name of a small weight, the twentieth part of a scruple in apothecaries weight, and the twenty-fourth of a penny-weight troy. See the article **WEIGHT**.

A grain-weight of gold-bullion is worth two-pence, and that of silver but half a farthing.

**GRAIN** also denotes the component particles of stones and metals, the veins of wood, &c. Hence cross-grained, or against the grain, is contrary to the fibres of wood, &c.

**GRAINING-BOARD**, among curriers, an instrument called also a pummel, used to give a grain to their leather. See the article **CURRYING**.

**GRAMEN**, GRASS, in botany. See the article **GRASS**.

**GRAMEN JUNCEUM**, a name used by Morison for a species of plantain.

**GRAMINEOUS CROWN**, in antiquity, the same with the obsidional one. See the article **CROWN**.

**GRAMINEOUS HERBS**, those with narrow oblong leaves, without any pedicle.

**GRAMINIFOLIA**, a plant called by Linnaeus zannichellia. See **ZANNICHELLIA**.

**GRAMMAR**, *грамматика*, the art of speaking and writing any language with propriety.

Grammar is usually divided into four parts, orthography, etymology, syntax, and prosody. See **ORTHOGRAPHY**, &c. Many are of opinion, that grammar is an art or science antecedent to languages; which, according to them, ought to be accommodated to these original principles. But just the reverse of this is true. Languages were by no means made for grammar, but that for them. It serves to teach languages to those who are ignorant of them; and, therefore, should be accommodated to the genius of each language in particular. In a philosophical view, indeed, there are some circumstances indifferently essential to them all; but this natural agreement is so much altered by the different customs of various languages, as to be for the most part utterly unknown. A just and exact method of grammar, therefore, can be only that, which, supposing a language introduced by custom, without attempting any alteration in it, furnishes certain observations called rules, to which the methods of speaking used in this language, may be reduced; and this collection of rules is what is called grammar.

Grammar, says lord Bacon, is of two kinds; the one having relation to speaking, the other to writing: for, as Aristotle well observed, words are the signs or marks of thoughts, and letters of words. See the articles **LANGUAGE**, **LETTER**, **WORD**, &c.

According to the same noble author, grammar holds the place of a conductor, in respect of the other sciences; and tho' the office be not noble, it is extremely necessary; especially as the sciences, in our times, are chiefly derived from the learned languages. It is of less use in maternal languages, than in learning the foreign ones; but is most of all serviceable in the dead ones, or such as are only preserved in books.

*Philosophical GRAMMAR*, one proposed by lord Bacon, not upon any analogy which words bear to each other, but such as should diligently examine the analogy or relation betwixt words and things. He disapproves of too curious an enquiry about the imposition and original etymology of names. This he thinks an elegant, and as it were a waxen subject, that may be handsomely wrought and twisted, but is attended with little truth and advantage. But, says he, it would be a noble kind of grammar, if any one, well versed in languages, both the learned and vulgar, should treat of their various properties; shewing wherein each of them excelled, and fell short: for thus languages might be enriched by mutual commerce; and one beautiful image of speech, or one grand model of language, for justly expressing the sense of mankind, formed, like the Venus of Apelles, from the excellencies of several. And thus, at the same time, we should have some considerable marks of the genius and manners of people and nations, from their respective languages. See farther remarks on this subject in Bacon's *Doctrine of Delivery*, Sect. 7.

**GRAMMAR** is also used for a book containing the rules of this art, methodically digested; of which there are multitudes indeed, but few good ones.

**GRAMMAR** is likewise used in a synonymous sense with elements, as a geographical grammar, &c.

**GRAMMARIAN**, one that is skilled in, or teaches grammar.

Antiently the name grammarian was a title of honour, literature, and erudition; being given to persons accounted learned in any art or faculty whatever. But it

is otherwise now, being frequently used as a term of reproach, to signify a dry plodding person, employed about words and phrases, but inattentive to the true beauties of expression and delicacy of sentiment. The antient grammarians, called also philologers, must not be confounded with the grammatists, whose sole business was to teach children the first elements of language. Varro, Cicero, Meffala, and even Julius Cæsar, thought it no dishonour to be ranked among grammarians, who had many privileges granted to them by the roman emperors.

**GRAMMATICAL**, in general, something belonging to grammar. See the article **GRAMMAR**.

**GRAMMONT**, a town of the austrian Netherlands, in the province of Flanders, situated on the river Dender: east lon.  $3^{\circ} 30'$ . and north lat.  $50^{\circ} 55'$ .

**GRAMPOUND**, a borough-town of Cornwall, thirty-eight miles south-west of Launceston: west lon.  $5^{\circ} 25'$ , and north lat.  $50^{\circ} 20'$ .

It sends two members to parliament.

**GRAMPUS**, in ichthyology, the english name of a fish of the dolphin-kind, with the snout turning upwards, and broad serrated teeth. See **DELPHINUS**.

**GRAN**, a city of lower Hungary, situated on the Danube: east lon.  $18^{\circ} 40'$ , north lat.  $48^{\circ}$ .

**GRANA REGIA** and **TIGLIA**, in the materia medica, names by which the purging grains or seeds of ricinus are called. They are violent and dangerous purgatives, prescribed in the Indies in rheumatisms and dropsies; but whilst safer and equally efficacious medicines may be had, there is no necessity to have recourse to these.

**GRANADA**, a province of Spain, bounded by Andalusia on the north, by Murcia and the Mediterranean on the east, by the same sea on the south, and by Andalusia on the west.

**GRANADA**, the capital city of the province of Granada, in Spain, situated two hundred miles south of Madrid: west lon.  $3^{\circ} 40'$ , and north lat.  $37^{\circ} 15'$ .

**GRANADA**, a province of terra firma, in south America, bounded on the north by the provinces of Carthagena and St. Martha, on the east by Venezuela, by Popoyan on the south, and by Darien on the west.

**GRANADA**, a city of Mexico, in north America, situated on the side of the lake Nicaragua: west lon.  $89^{\circ}$ , and north lat.  $11^{\circ} 8'$ .

**GRANADA** is also the most southerly of the Caribbee-islands, situated one hundred and fifty miles south-west of Barbadoes: west lon.  $61^{\circ} 30'$ , and north lat.  $12^{\circ} 15'$ .

**GRANADIER**, a soldier armed with a sword, a firelock, a bayonet, and a pouch full of hand-granaadoes. They wear high caps, are generally the tallest and briskest fellows, and are always the first upon all attacks.

Every battalion of foot has generally a company of granadiers belonging to it, or else four or five granadiers belong to each company of the battalion; which, on occasion, are drawn out, and form a company of themselves. These always take the right of the battalion.

**Horse-GRENADIERS**, called by the French *grenadiers volans*, or flying-grenadiers, are such as are mounted on horseback, and fight on foot: their exercise is the same with the other grenadiers.

**GRANADILLA**, **PASSION-FLOWER**, a plant called by Linnæus *passiflora*. See the article **PASSIFLORA**.

**GRANADILLOS**, some of the Caribbee-islands, situated between the island of St. Vincent and Granada; but so inconsiderable that no nation has thought them worth possessing.

**GRANADO**, a hollow ball or shell, of iron or other metal, about two inches and a half in diameter; which being filled with fine powder, is set on fire by means of a small fusee fastened to the touch-hole, made of the same composition as that of a bomb: as soon as the fire enters the shell, it bursts into many pieces, much to the damage of all that stand near. See the article **BOMB**.

Thuanus observes, that the first time granadoes were used, was at the siege of Wachtendonck, a town near Gueldres: and that the inventor was an inhabitant of Venlo, who, in making an experiment thereof, occasioned two thirds of that city to be burnt, the fire being kindled by the fall of a granado.

**GRANARY**, a building to lay or store corn in, especially that designed to be kept a considerable time.

Sir Henry Wotton advises to make it look towards the north, as much as may be, because that quarter is the coolest and most temperate. Mr. Worlidge observes that the best granaries are built of brick, with quarters of timber wrought in the inside, to which the boards may be nailed, with which the inside of the granary must be lined so close to the bricks, that there

there may not be any room left for vermine to shelter themselves. There may be many stories one above another, which should be near the one to the other; because the shallower the corn lies, it is the better, and more easily turned.

Some have two granaries, one above the other, and fill the upper with wheat, or other corn; the upper one having a small hole in the floor, by which the corn falls down into the lower one, like the sand in an hour-glass; which, when it is all come down into the lower granary, is carried up again into the upper one; and by this means, is kept continually in motion, which is a good preservative for the corn. A large granary, full of square wooden pipes, may likewise serve to keep corn from heating.

In Kent, when corn is first brought into granaries, they lay it about half a foot thick, turn it twice a week, and once in that time screen it, for the first two months; after which they lay it a foot thick for two months more, turning it once or twice a week, and screening it proportionably according as the weather is moist or dry. After five or six months more, they lay it two feet thick, and turn it once a fortnight, screening it once a month, as occasion requires. After a year, they lay it two feet and a half, or three feet thick, and turn it once in three weeks or a month, screening it proportionably. When it has lain two years or more, they turn it once in two months, and screen it once a quarter. And in this manner they proceed, turning and screening it at greater or smaller intervals, according as they find it in brightness, hardness, and driness; for the oftener the grain is turned, the better it proves. For this purpose, an empty space, about a yard wide, is left on all sides of the room, and another at six feet distance through the whole area, into which empty spaces they turn the corn, as often as necessary. See the article CORN.

Before the corn is brought into granaries it ought to be well cleaned from impurities, and thoroughly dried; for it is observable, that such corn succeeds best.

In many parts of Africa, they preserve corn in deep pits, made in dry sandy ground, or even the solid rock: on the floor of these they lay a bed of straw, then a stratum of corn; after that another bed of straw, and then another of corn; and in this manner they proceed till the whole is filled up, taking care to place a

layer of straw between the corn and the sides of the pit.

**GRANATE**, or **GARNET**; *granatus*, in natural history. See **GARNET**.

**GRAND**, a term borrowed from the french, of the same import with *great*.

**GRAND ASSISE**, in law, a writ to determine the right of property in a real action.

**GRAND CAPE**. See **CAPE MAGNUM**.

**GRAND DAYS**, are those days in the several terms, which are solemnly kept in the inns of court and chancery, *viz.* candlemas-day, ascension-day, St. John the Baptist, and All saints-day.

**GRAND DISTRESS**, a writ that lies in two cases, either when a tenant or defendant is attached, and does not appear; or where he has appeared, if he afterwards makes default, in which case this process lies instead of a petit cape; and thereby all the goods and chattels of the defendant may be distrained within the county. See the article **DISTRESS**.

**GRAND JURY**, is the jury who find bills of indictment before justices of peace and gaol-delivery, or of oyer and terminer, &c. against any offenders that may be tried for the fact.

**GRANDE**, a branch of the river Niger, in Africa, which discharges itself into the Atlantic ocean, in 15° west lon. and 11° north lat.

**GRANDE**, is also a river of Brasil, in the province of Del Rey, in south America, which discharges itself into the Atlantic ocean, in 51° west lon. and 32° south lat.

**GRANDEE**, a designation given to a nobleman of Spain or Portugal.

The *grandees* are suffered to be covered before the king, who treats them like princes, styling them Illustrious, in his letters; and in speaking to them, or of them, they are styled Eminences.

**GRANDENTZ**, or **GRAUDENTZ**, a city of Poland, forty-two miles south of Dantzick: east longit. 19°, and north lat. 53° 30'.

**GRANDPRE**, a town of Champaign, in France, thirty miles east of Rheims: east lon. 4° 56', and north lat. 49° 18'.

**GRANGE**, a house or farm, not only furnished with necessary places for all manner of husbandry, as stables for horses, stalls for cattle, &c. but where there are granaries and barns for corn, hay-lofts, &c. And by the grant of a grange, such places will pass, without being particularly mentioned.

**GRANICUS**, a little river near the Hellespont, in the lesser Asia, where Alexander

ander fought the first battle with the forces of Darius.

**GRANIFEROUS** PODS, among herbalists, those that bear small seeds like grain.

**GRANITE**, *granita*, in natural history, a distinct genus of stones, composed of separate and very large concretions rudely compacted together, of great hardness, giving fire with steel, not fermenting with acids, and slowly and imperfectly calcinable in a great fire.

Of this genus there are three species :

1. The hard white granite, with black spots, commonly called moor-stone: this is a very valuable kind, consisting of a beautiful congeries of very variously constructed and differently coloured particles, not diffused among, or running into one another, but each pure and distinct, though firmly adhering to whichever of the others it comes in contact with, and forming a very firm mass: it is much used in London for the steps of public buildings, and on other occasions where great strength and hardness are required.

2. The hard red granite, variegated with black and white, and common in Egypt and Arabia. 3. The pale whitish granite, variegated with black and yellow. This is sometimes found in strata, but more frequently in loose nodules, and is used for paving the streets.

**GRANIVOROUS**, an appellation given to animals which feed on corn or seeds. These are principally of the bird-kind.

**GRANT**, in law, a conveyance in writing of such things as cannot pass or be conveyed by word only; such are rents, reversions, services, advowsons in gross, tithes, &c.

The person making such a conveyance is called the grantor, and he to whom the grant is made, the grantee.

A grant has usually the words *give and grant*, &c. which in a deed of what lies in grant, will amount either to a gift, grant, feoffment, or release, &c. and accordingly may be pleaded: though to every good grant it is requisite that there be a grantor, or person able to give; a grantee, capable of the thing granted; something granted, as grantable; that it be done in the manner the law requires; and that there be an agreement to, and an acceptance of the grant by him to whom made, &c.

When persons *non sane memorie* make grants, they may be good as to themselves, though voidable by their heirs, &c. and notwithstanding infants and

feme coverts are prohibited by law to be grantors, yet they may be grantees: however, an infant, when at his full age, may disavow to his grant, and the husband to that made to his wife. All grants are expounded according to the substance of the deed in a reasonable sense, and agreeable to the intent of the parties. In case a person grants a rent-charge out of land, and he has then nothing in the same, admitting he afterwards purchases the land, nevertheless the grant is void. And the law does not allow of grants of titles only, or imperfect interest, or of things that are merely future. Likewise grants may be void on account of uncertainty, impossibility, being against the law, &c.

**GRANT** of the king is good for himself and his successors, though they are not named therein: but the king may not grant away an estate-tail in the crown.

A grant tending to a monopoly cannot be made by the king, to the detriment of the interest and liberty of the subject; neither can the king make a grant non obstante any statute, made or to be made; for if he does, any subsequent statute prohibiting what is granted will be a revocation of the grant: yet there may be a non obstante to a former grant made by the king, where he has been deceived in such grant, as where it contains more than what was intended to be granted, or there is any deceit in the consideration, &c. by which the first grant becomes void.

**GRANT**, an ancient name for the river Cam. See the article CAM.

**GRANTHAM**, a borough-town of Lincolnshire, twenty-two miles south of Lincoln.

It sends two members to parliament.

**GRANVILLE**, a port-town of Normandy, from whence the noble family of Carteret take the title of earl.

**GRANULATED**, something that has undergone granulation. See the next article.

**GRANULATION**, according to Cramer, is the reducing metals to small particles, in order to promote their fusion and mixture with other bodies.

This is more coarsely done in the wet way, by means of running them into water through a new broom, or rolling them about in a hollow cylinder contrived on purpose: but the nicer and finer is the dry method, by means of a wooden box chalked within. Lead is very nicely granulated this way, and is to be done in the following manner.





Fig. 1. GNOMON.

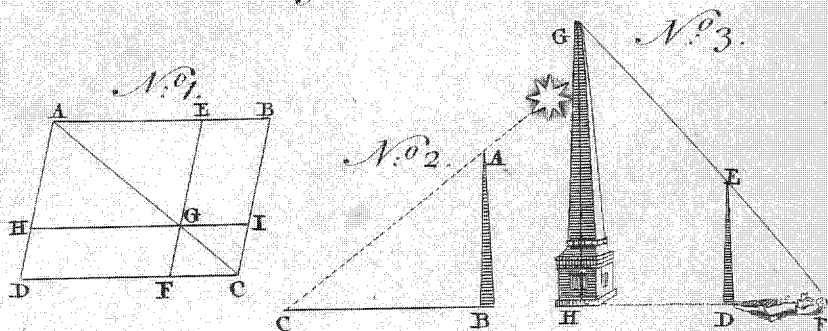


Fig. 2. GRAPHOMETER.

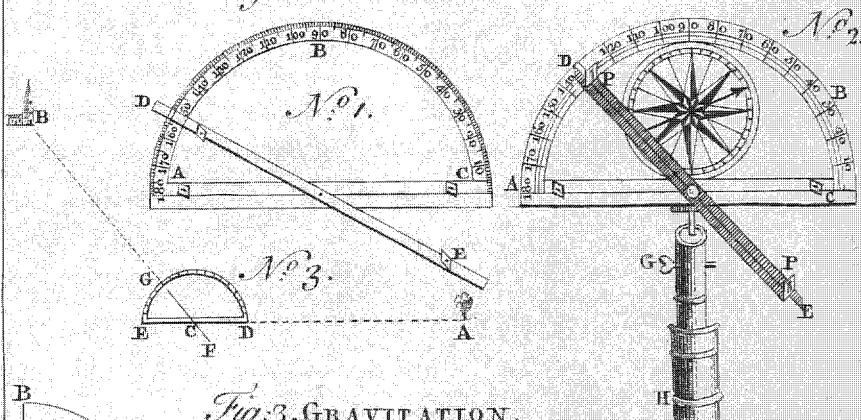


Fig. 3. GRAVITATION.

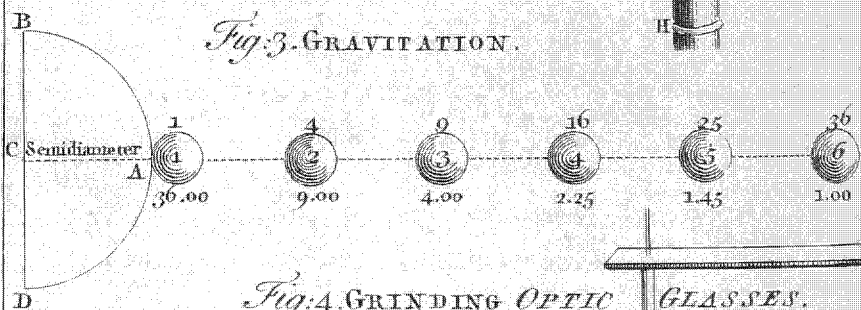
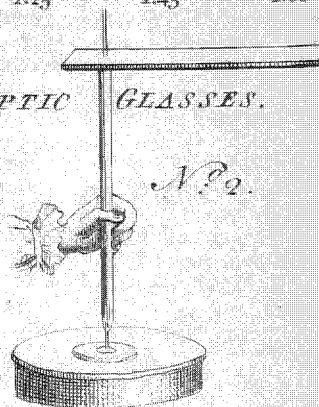
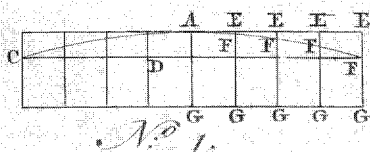


Fig. 4. GRINDING OPTIC GLASSES.



Put a quantity of lead into an iron-ladle, and melt it slowly over a gentle fire; so soon as it is perfectly liquid, pour it into a round wooden box, with a wooden cover nicely fitted to it; and let both that and the cavity of the box be well rubbed over with chalk: shut the box immediately when the melted lead is in, and shake it violently, so that the metal within may be agitated forcibly against all parts of the box. Continue this agitation till the metal is cold, and on opening the box, you may find the greatest part of it finely granulated, or comminuted into very small porous grains. Let the chalk that adheres to these grains be rubbed off, and then sift them, to make them of an equal size.

Lead, tin, and brass are the most proper metals for this process, since these, when ready to melt, are always extremely brittle, somewhat like wetted sand. This sort of granulation, therefore, cannot be obtained from such metals as are the more tenacious the nearer they come to fusion, as gold, silver, &c. for which reason these can only be granulated the other and coarser way, by means of water.

**GRANULOSE ROOTS**, those composed of small knobs, like grains of corn.

**GRANUM**, in the materia medica. See the article *GRANA*, *supra*.

**GRAPE**, the fruit of the vine, *vitis*. See the article *VINE*.

Those kind of grapes which are thin-skinned, grow sooner ripe than others, and will thrive in a temperate climate, where the others will not. If it happen that grapes are struck with hail at the time that they are large and near ripening, they never become ripe at all, but harden, and so remain. See *WINE*.

The best sort of grapes are the white and sweet grapes with a tender skin, and without stones. It is said, that this fruit, when ripe, is of an hot and moist nature, very fattening, refreshing an inflamed liver, provoking urine, and good for the stomach; yet being windy, they disturb the entrails, so that they are best eaten before meals, or else with pomegranates, and other sharp fruit: but if for a few days they are hung up, they will lose their windiness, and become better. See the article *RAISIN*.

The juice of the agrestæ, or unripe wild grapes, is the omphacinum of the antients, as their oleum omphacinum was the expressed oil from the unripe olives. See the article *AGRESTÆ*.

They used to expose the grapes to the sun for some days, and then press out their juice into large vats: and in the time of Dioscorides, they used to let it stand open in them, exposed to the sun, till most of the humidity was exhale, and the remainder inspissated into a rob, a form much used among the antients. This is reckoned a cooler, but has no place in our present pharmacy.

**GRAPHOMETER**, a mathematical instrument, otherwise called a semi-circle, the use of which is to observe any angle, whose vertex is at the center of the instrument in any plane (though it is most commonly horizontal, or nearly so) and to find how many degrees it contains.

The graphometer is a graduated semi-circle ABC, made of wood, brass, or the like, and so fixed on a fulcrum GH, by means of a brass-ball and socket, that it easily turns about, and retains any situation. It has two sights-fixed on its diameter AC, and at the center there is commonly a magnetical needle and compass in a box. There is likewise a moveable ruler, or index ED, with two sights P, P; which turns round the center, and retains any situation given it. See plate CXIX. fig. 2. n<sup>o</sup> 1. and 2.

To measure by this instrument any angle ACB (*ibid.* n<sup>o</sup> 3.) in any plane, and comprehended between the right lines AC and BC, drawn from two points A and B, to the place of station C. Let the graphometer be placed at C, supported by its fulcrum; and let the immoveable sights on the diameter of the instrument DE, be directed towards the point A; and likewise while the instrument remains immoveable, let the sights of the ruler FG, which is moveable about the center C, be directed to the point B. Now it is evident, that the moveable ruler cuts off an arch DH, which is the measure of the angle ACB, sought. Moreover, by the same method, the inclination of DE, or of FG, may be observed with the meridian line, which is pointed out by the magnetic needle inclosed in the box, and moveable about the center of the instrument.

**GRAPTOLITHUS**, in natural history, a name given by Linnæus to a kind of stone, resembling a geographical map, found in Scandinavia.

**GRAPNELS**, a sort of anchors with four flooks, serving for boats to ride by.

There is also a kind called fire and chain-grapnels, made with four barbed claws

instead of flocks, and used to catch hold of the enemies rigging, or any other part, in order for boarding them. See plate CXXI. fig. 1.

**GRASS**, *gramen*, in botany, &c. a name given to several distinct plants, as the agrostis or couch-grass, the briza or quacking-grass, &c. Under the term grass are also comprehended all manner of herbaceous plants serving for the food of cattle, as clover, rye-grass, &c. The best season for sowing grass-seed is the latter end of August and the beginning of September, that the grass may be well rooted before the frost sets in, which is apt to turn the plants out of the ground when not well rooted. This seed should be sown in moist weather, or when there is a prospect of showers; but where this cannot be performed in autumn, the seeds may be sown in the spring, about the latter end of March, if the season proves favourable.

Some people mix clover and rye-grass seeds together, allowing ten pounds of clover and one bushel of rye-grass to an acre; but this is only to be done where the land is designed to remain but three or four years in pasture, because neither of these kinds are of long duration; so that where the land is designed to be laid down for many years, it will be proper to sow with the grass-seeds some white trefoil, or dutch clover, which is an abiding plant, and spreads close to the surface of the ground, sending forth roots at every joint, and makes the closest sward of any, and is the sweetest food for cattle: six or eight pounds of this seed should always be sown upon each acre.

The land on which grass-seed is intended to be sown, should be well plowed, and cleared from the roots of noxious weeds, such as couch-grass, fern, rushes, heath, gorse, broom, rest-harrow, &c. which if left in the ground, will soon get the better of the grass, and over-run the land. Therefore, where any of these weeds abound, it will be a good method to plow up the surface in April, and let it lie some time to dry; then lay it in small heaps, and burn it: the ashes so produced will be a good manure for it. But where couch-grass, fern, or rest-harrow grow thick, and their roots run far underground, the land should be plowed two or three times pretty deep in dry weather, and the roots carefully harrowed off after each plowing, which is the most certain method of destroying them.

Before the seed is sown, the surface of the ground should be made level and fine, otherwise the seed will be buried unequally. The quantity of grass-seed for an acre of land is usually three bushels, if the seed be clean; otherwise a much greater quantity must be allowed: when the seed is sown it must be gently harrowed in, and the ground rolled with a wooden roller, which will make the surface even, and prevent the seeds being blown in patches. If, when the grass comes up, there should be any bare spots where the seed has not grown, they may be sown again, and the ground rolled, which will fix the seeds, and the first kindly showers will bring up the grass.

If any thistles, ragwort, or such other troublesome weeds in the following spring come up among the grass, they should be carefully cut up with a spaddle before they grow too large; and this should be repeated two or three times in the summer, which will effectually destroy them.

As to grass-plats and green walks, they are made, for the most part, not by sowing grass-seed, but by laying turfs: and indeed the turfs from a fine common or down, are much preferable to sown grass: but if walks or plats are to be made by sowing, the best way is to procure the seed from those pastures where the grass is naturally fine and clear, or else the trouble of keeping it from spiry or benty grass will be very great, and it will scarce ever look handsome.

In order to sow grass-walks, the ground must be first dug; and when it has been first dressed and laid even, it must be very carefully raked over, and all the clods and stones taken off, and then covered over an inch thick with good mould. This being done, the seed is to be sown pretty thick, that it may come up close and short; it must then be raked over again, to cover the seed, that if the weather should happen to be windy, it may not be blown away. It ought also to be observed, that where grass is sown in gardens, either for lawns or walks, there should always be a good quantity of the white trefoil or dutch clover sown with it; for this will make a fine turf much sooner than any other sown grass, and will continue a better verdure than any other of the grass-tribe.

In order to keep grass-plats or walks handsome, and in good order, you may sow in autumn fresh seed over any places that

that are not well filled, or where the grafs is dead: but nothing improves grafs fo much, as mowing and confant rolling.

When turf is laid in gardens, it is a general practice to cover the furface of the ground under the turf, either with fand or very poor earth: the defign of this is to keep the grafs fine, by preventing its growing too rank. This is proper enough for very rich ground, but it is not fo for fuch land as is but middling, or poor; for when this is praftised in fuch places, the grafs will foon wear out and decay in patches.

When turf is taken from a common or down, fuch ought to be chofen as is free from weeds: and when it is defigned to remain for years without renewing, a drefling fould be laid upon it every other year, either of very rotten dung, afhes, or, where it can be eafily procured, very rotten tan; but thefe dreflings fould be laid on early in the winter, that the rain may wafh them into the ground, otherwife they will occafion the grafs to burn, when the warmth of the fummer begins.

Where grafs is fo drefled, and kept well rolled and mowed, it may be kept very beautiful for many years; but where it is not drefled, or fed with fheep, it will rarely continue handfome more than eight or ten years.

**GRASSHOPPER**, in zoology, a fpecies of gryllus, frequent in paftures. See the article **GRYLLUS**.

Thefe infests fometimes infest particular places in prodigious fwarms, and eat up the whole fruits of the earth, like the devouring locufis. See the article **LOCUST**.

**GRATIAS A DIOS**, a cape or promontory of the province of Honduras, in Mexico: weft lon.  $84^{\circ}$ , north lat.  $14^{\circ} 30'$ .

**GRATINGS**, in a fhip, a kind of lettuce-work formed of ledges and battins, the fquare holes of which being three or four inches wide, are for the current footing of men over hatch-ways, to give air below, and vent for the fmoke in an engagement.

**GRATIOLA**, **HEDGE-HYSSOP**, in botany, a genus of the *diandria-monogynia* clafs of plants, the flower of which is monopetalous and ringent; its tube is longer than the cup, and of an angular figure, and the limb is fmall, and divided into four parts: the fruit is an oval pointed capfule, compofed of two valves, and containing two cells; in which are

included numerous fmall feeds. Some erroneoufly confound it with the digitalis, or fox-glove. See **DIGITALIS**.

It is good in dropfies, jaundices, and other chronic complaints, taken in infufion; and though a rough and violent medicine, operating both by vomit and ftool, is reckoned a very powerful one.

**GRATIOSA**, one of the Azores-iflands: weft lon.  $29^{\circ}$ , and north lat.  $39^{\circ}$ .

**GRATZ**, a city of Germany, and capital of the dutchy of Stiria, fixty-five miles fouth of Vienna: eaft lon.  $15^{\circ} 55'$ , and north lat.  $47^{\circ} 20'$ .

**GRAVE**, in mufic, is applied to a found, which is of a low or deep tune. See the article **TUNE**.

The thicker the cord or ftring, the more grave is the note or tone; and the fmall, the more acute. The gravity of founds depends on the fownefs of the vibratory motions of the chord; and their acutenefs, on its quick vibrations.

**GRAVE**, in the italian mufic, denotes a very grave and flow motion, fomewhat fafter than adagio, and flower than largo.

**GRAVE ACCENT**, in grammar, fhews that the voice is to be lowered: its mark is wrong printed in the article **ACCENT**, and fould ftand thus.

**GRAVE** alfo denotes a tomb, or fepulchre, wherein the dead are buried. See the articles **BURIAL**, **TOMB**, and **SEPULCHRE**.

**GRAVE**, in geography, a ftrong city of the Netherlands, in the province of dutch Brabant, eight miles fouth of Nimeguen: eaft lon.  $5^{\circ} 45'$ , and north lat.  $51^{\circ} 50'$ .

**GRAVEDO**, in medicine, a heavinefs and pain in the head, which always accompanies a catarrh. See **CATARRH**.

**GRAVEL**, in natural hiftory and gardening, a congeries of pebbles, which, mixed with a fuff loam, makes lafting and elegant gravel-walks; an ornament peculiar to our gardens, and which gives them the advantage over thofe of other nations.

There are many different opinions about the choice of gravel; fome are for having it as white as poffible, and in order to make the walks more fo, caufe them to be rolled with ftone-rollers, which are often hewn by the mafons fo as to add a whitenefs to the walks; but this renders them troublefome to the eyes by their reflecting too ftrongly the rays of light; this therefore fould be avoided, and fuch gravel as will lie fmoother, and reflect the leaft,

least, should be preferred. Again, some screen the gravel too fine, but this is an error; for if it be cast into a round heap, and the great stones only are raked off, it will be the better. There are many kinds of gravel which do not bind, and by this means cause a continual trouble of rolling, to little or no purpose; as for such, if the gravel be loose or sandy, you should take one load of strong loam and two of gravel, and so cast them well together.

The month of March is the properest time for laying gravel; for it is not prudent to do it sooner, or to lay walks in any of the winter-months before that time. In making these walks, great regard must be had to the level of the ground, so as to lay the walks with easy descents toward the low parts of the ground, that the wet may be easily drained off: but when the ground is level, it will be proper to have sink-stones laid by the sides of the walk, and at convenient distances, to let off the wet; and when the ground is naturally dry, the drains from the sink-stones may be contrived so as to convey the water into fesspools, from which the water will soak away in a short time: but in wet lands there should be under ground drains, to convey the water off, either into ponds, ditches, or the nearest place proper to receive it.

Some are apt to lay gravel walks too round; but this is an error, because they are not so good to walk upon; and besides, it makes them look narrow; one inch is enough in a crown of five feet; and it will be sufficient, if a walk be ten feet wide, that it lies two inches higher in the middle than it does on each side: if fifteen feet, three inches; if twenty feet, four inches; and so in proportion.

For the depth of gravel-walks, six or eight inches may do well enough; and a foot in thickness will be sufficient for any; but then there should always be a depth of rubbish laid under the gravel, especially if the ground be wet.

Some turn up gravel walks into ridges in December, in order to kill the weeds: but this is very wrong, since it never answers the end, and therefore if constantly rolling them after rain and frost will not effectually kill the weeds and moss, you should turn the walks in March, and lay them down at the same time.

In order to destroy worms that spoil

the beauty of gravel or grass-walks, some recommend the watering them by water made very bitter by walnut-tree leaves being steeped in it: but if in the first laying of the walks there be a good bed of lime-rubbish laid in the bottom, it will be the most effectual method to keep out the worms, for they do not care to harbour near lime.

GRAVEL, in medicine, a terrible distemper arising from a gritty matter concreting into small stones in the bladder. See the article **STONE**.

GRAVELIN, a port-town of the french Netherlands, twelve miles south-west of Dunkirk.

GRAVELLING, a misfortune that happens to a horse by travelling, occasioned by gravel-stones getting between the hoof and the shoe, which settling at the quick, there fester and fret. It is cured by taking off the shoe, picking out all the gravel, and afterwards washing and cleansing the part affected; which done. sheep's tallow and bay salt melted together, are to be poured hot upon it, and the shoe set on again; and at two or three dressings it will be healed.

GRAVELLY LAND, or soil, that abounding with gravel and sand, which easily admits of heat and moisture; and the more stony they are, the more barren they prove.

The best produce of these lands in corn, is rye, white-oats, brank-turneps, &c. The natural produce in weeds is quick-grass, sorrel, broom, furze, brakes, heath, &c. The best manure is marl, or any sort of clay that will dissolve with the frost, cow-dung, chalk, mud, and half-rotten straw from dunghills.

GRAVENE, a town of Swabia, in Germany, thirty miles west of Ulm.

GRAVER, in the art of engraving, a tool by which all the lines, scratches, and shades are cut in copper, &c.

Gravers are of three sorts, round-pointed, square-pointed, and lozenge. The round are the best for scratching withal; the square-pointed are for cutting the largest strokes; and the lozenge-pointed ones for the most fine and delicate strokes: but a graver of a middle form, between the square and lozenge-pointed, will make the strokes or hatches appear with more life and vigour.

The manner of making the gravers is as follows: provide some cross-bow steel, and procure it to be beaten out into small rods, and softened, and then, with a good

good file, shape them as you please. This being done, heat them red-hot, and then immediately dip them in soap, which will render them very hard. In doing this observe, that if you turn your hand never so little awry in dipping them into the soap, the graver will be crooked. If the graver prove too hard, lay the end of it upon red-hot charcoal, till it begin to grow yellowish, and afterwards dip it in tallow (or, as some say, in water) and it will toughen it. Then having sharpened the graver upon an oil-stone, strike the point of it into a piece of hard box-wood, to take off the roughness about the points, which was caused by whetting it upon the stone. In the last place, touch the edge of the graver with a file; if it cuts, it is too soft, and will not work; but if it will not touch it, it is fit for the work. If the point of the graver breaks, it is a sign that it is tempered too hard; but it will frequently, after a little use by whetting, come to be well conditioned.

**GRAVESEND**, a port town of Kent, situated on the southern shore of the river Thames, twenty miles east of London.

**GRAVINA**, a city and bishop's see of the kingdom of Naples, twenty-seven miles south-west of Barri: east lon.  $17^{\circ}$ , and north lat.  $41^{\circ}$ .

**GRAVING**, or **ENGRAVING**. See the article **ENGRAVING**.

**GRAVING**, in the sea-language, is bringing a ship a-ground, and then burning off with furze, reed, or broom, all the filth and foulness that sticks to her bottom without-board, in order to pay her a new.

**GRAVITATION**, in physiology, a species of attraction, of the tendency of one body towards another, in consequence of its gravity. See **ATTRACTION** and **GRAVITY**.

*Cause of GRAVITATION.* This indeed is so difficult to be accounted for, that sir Isaac Newton himself is cautious how he does it. At the close of his *Principia* he tells us, that he has not hitherto assigned the cause of gravity, which is a power, however, that proceeds from a cause reaching even to the centers of the sun and planets, without losing its virtue, and that acts, not according to the particles of the surface, like a mechanical cause, but according to the quantity of solid matter in bodies; its action being every way extended to immense distances, and always decreasing in a duplicate proportion of them. The gravity of bodies towards the sun,

he further says, is composed of their gravity towards all its particles; and in going from the sun, decreases exactly in a duplicate proportion of the distance to the orbit of saturn; and even the farthest aphelia of the comets, if those aphelia are at rest. But the reason of these properties of gravity, I could never hitherto, says sir Isaac, deduce from phenomena; and am unwilling to frame hypotheses about them: for whatever is not deduced from phenomena, ought to be called an hypothesis; and no sort of hypotheses are allowable in experimental philosophy, wherein propositions are deduced from phenomena, and made general by induction. Thus the impenetrability, the mobility, the momentum of bodies, the laws of motion and gravity, were discovered; and it is enough that gravity has a real existence, and acts according to such laws as we have delivered, and that it suffices to produce all the motions of the celestial bodies, and of our sea. See the articles **PLANET**, **MOON**, &c.

*Laws of GRAVITATION* are as follows:

1. It is common to all bodies, and mutual between them.
  2. It is proportional to the quantity of matter in bodies.
  3. It is exerted every way from the center of the attracting body in right-lined directions.
  4. It decreases as the squares of the distances increase: thus, if a body at A (plate CXIX. fig. 3.) on the earth's surface, distant one semidiameter from the center C, weighs 36.00 pounds, it will, at the distance of 2, 3, 4, 5, 6, semidiameters, weigh 9.00, 4.00, 2.25, 1.45, 1.00 pounds, which numbers decrease as the squares of the distances increase. The truth of this proposition is not to be had from experiments; the utmost distance we convey bodies to, from the surface of the earth, bearing no proportion to their distance from its center, but is sufficiently clear from the motions observed by the heavenly bodies. See the articles **CENTRAL FORCES**, **COPERNICAN SYSTEM**, &c.
- Hence we learn, that all bodies have gravity, or are heavy, and that there is no such thing as absolute levity in nature: and by the second law, the gravitation of all bodies is proportional to the quantity of matter they contain: and hence, since bodies of equal bulk are found to have unequal quantities of matter, it evidently follows, that a vacuum, or solid void of matter, must necessarily exist, and

and that an absolute plenum is a doctrine unphilosophical, and equally false and absurd. See VACUUM and DENSITY.

Also from the third law it follows, that all bodies descending freely by their gravity, tend towards the earth in right lines perpendicular to its surface, and with equal velocities, abating for the resistance of the air ; as is evident from the second law above. See the article DESCENT.

Again, since the gravitation is always as the quantity of matter, and inversely as the square of the distance, it follows that were the internal parts of the earth a perfect void, or hollow concavity, a body placed any where therein, would be absolutely light, or void of gravity ; but supposing the earth a solid body throughout, the gravitation from the surface to the center will decrease with the distance, or it will be directly proportional to the distance from the center.

Gravitation being found by many experiments and observations to affect all the matter of bodies equally, we have hence more reason, says Mr. Maclaurin, to conclude its universality, since it appears to be a power that acts not only at the surfaces of bodies, and on such bodies as are removed at a distance from them, but to penetrate into their substances, and into that of all other bodies, even to their centers, to affect their internal parts with the same force as the external, to be obstructed in its action by no intervening body or obstacle, and to admit of no kind of variation in the same matter, but from its different distances only from that to which it gravitates.

This action of gravity on bodies arises from its action on their parts, and is the aggregate of these actions ; so the gravitation of bodies must arise from the gravity of all their particles towards each other. The weight of a body towards the earth, arises from the gravity of the parts of that body : the gravity of a mountain towards the earth, arises from the gravitation of all the parts of the mountain towards it ; the gravitation of the northern hemisphere towards the southern, arises from the gravitation of all its parts towards it ; and if we suppose the earth divided into two unequal segments, the gravitation of the greater towards the lesser, arises from the gravitation of all the parts of the greater towards the lesser. In the same manner the gravity of the whole earth, one particle being excepted, toward that particle must arise from the

quantity of gravitation of all the other particles of the earth towards that particle. Every particle, therefore, of the earth gravitates towards every other particle : and for the same reason every particle in the solar system gravitates towards every other particle in it.

*Center of GRAVITATION.* See CENTER.

*Line of GRAVITATION.* See LINE.

*Plane of GRAVITATION.* See PLANE.

**GRAVITY**, in physiology, the natural tendency of bodies towards a center. See the article GRAVITATION.

From the two following observations we not only learn that gravity is universal and inseparable from all matter ; but that it is an active principle, and the most general for conserving and recruiting motion.

Gravity, says Dr. Desaguliers, may be looked upon as a property of matter, which, though not essential, is yet universal, and in one sense inseparable from it ; that is, all parcels of matter, however modified, or all bodies, have a gravitation or attraction towards one another, as well in respect of the heavenly as of the terrestrial bodies. The tendency of heavy bodies towards the center of the earth, being owing to the same cause that makes the sun and planets tend towards one another.

The *vis inertia*, says sir Isaac Newton, is a passive principle by which most bodies persist in their motion or rest, receive motion in proportion to the force impressing it, and resist as much as they are resisted. By this principle alone there never could have been any motion in the world ; some other principle was necessary for putting bodies into motion ; for, from the various compositions of two motions, it is certain that there is not always the same quantity of motion in the world. But by reason of the tenacity of fluids, the attrition of their parts, and the weakness of elasticity in solids, motion is much more apt to be lost than got, and is always upon the decay. There is therefore a necessity of conserving and recruiting it, by active principles ; and such is the cause of gravity, by which the planets and comets keep their motion in their orbs, and bodies acquire great motion in falling, &c.

The same philosopher observes, that bodies immersed in fluids have two kinds of gravity, the one absolute, and the other relative.

Absolute gravity is the whole force where-with a body tends downwards ; for the laws



laws of which, see ACCELERATION, DESCENT, and GRAVITATION.

Relative gravity is the excess of gravity whereby a body tends downwards more than the fluid which surrounds it.

By the former kind of these gravities, says the last mentioned philosopher, the parts of fluids and of all bodies gravitate in their proper places, and by their joint weights compose the weight of the whole. For every whole has weight, as is evident in vessels filled with liquids; and the weight of the whole being equal to the weight of all the parts, must of necessity be composed of them. But bodies, by the latter kind of gravity, do not gravitate in their own places; that is, do not, when compared with one another, pregravitate; but mutually hindering each others endeavour to descend, they remain in their places as if they had no weight. Bodies in the air, which do not pregravitate, are thought by the vulgar not to be heavy, but those which pregravitate they judge to be heavy, so far as the air does not support them; so that the weight of bodies among the vulgar is only the excess of their real weight above that of the air. And therefore they call those things light which, being less heavy than the air, and yielding to its greater gravity, mount upwards. But these bodies are only comparatively light, not really so: for they will descend in vacuo. Thus bodies, which by reason of their greater or less gravity descend or ascend in water, are but comparatively and apparently heavy or light, and their comparative and apparent levity is the excess or defect whereby their real gravity either exceeds or falls short of the gravity of water. But whatever bodies neither descend by pregravitating, nor ascend by yielding to one that pregravitates, though they still by their real weights increase the weight of the whole, yet comparatively, and in a popular sense, they do not weigh in water. Hence,

*Specific GRAVITY*, called also relative, comparative, and apparent gravity, is that by which one body is said to be heavier or lighter than another of a different kind: thus lead is said to be specifically heavier than cork, because, supposing an equal bulk of each, the one would be heavier than the other. From hence it follows, that a body specifically heavier than another, is also more dense; that is, contains a greater

quantity of matter under the same bulk, because bodies weigh in proportion to the quantity of matter they contain.

If a solid be immersed in a fluid of the same specific gravity with itself, it will remain suspended therein in whatever part of the fluid it is put; but if the body is specifically heavier than the fluid, it will subside to the bottom. On the contrary, if the body is specifically lighter than the fluid, it will rise to the top.

A body being laid on the surface of a fluid specifically heavier than itself sinks in it, till the immersed part takes up the quantity of fluid, whose weight is equal to that of the whole body; and a body suspended in a fluid specifically lighter than itself, loses a part of its weight equal to that of a quantity of the fluid of the same bulk. See the article FLUID. For the method of finding the various comparative or specific gravities of fluids and solid bodies to the last degree of accuracy, see the articles HYDROSTATICAL BALANCE, and HYDROMETER. We shall here subjoin a table of the specific gravities of metals, minerals, ores, stones, fossils, animal substances, vegetable substances, miscellaneous substances, and fluids, considering rain-water as 1,000.

#### A Table of Specific GRAVITIES.

##### 1. Of Metals.

Fine, or pure gold	—	19,640
Gold of a guinea of George II.	—	17,150
Gold of a moidore	—	17,140
Silver fine or pure	—	11,091
Silver of a shilling of George II.	—	10,000
Lead	—	11,325
Copper	—	9,000
Brass cast	—	7,850
wrought	—	8,000
Steel tempered	—	7,704
Iron	—	7,645
Tin	—	7,550

##### 2. Of mineral Ores, &c.

Copper ore	—	3,775
Lead ore	—	6,800
Bismuth	—	9,700
Turbith mineral	—	8,325
Antimony from Germany	—	4,000
from Hungary	—	4,700
Speltar	—	7,065

##### 3. Of Stones, Fossils, &c.

Adamant or diamond	—	3,500
A pseudo-topaz	—	2,672
hyacinth	—	2,631
jasper	—	2,666
A bohemian granate,	—	4,360

A swedish granate	—	3,978	Ditto	—	1,240
Onyx stone	—	2,510	Ditto	—	1,433
A cornelian	—	3,290	Ditto	—	1,660
An english agate	—	2,512	Oyster-shell	—	2,892
A turcois stone	—	2,508	Murex-shell	—	2,590
Sardachates	—	3,595	A cockle-shell	—	2,520
A golden marcasite	—	4,589	Mother of pearl	—	2,480
Rock crystal	—	2,659	A piece of hard fish-skin	—	1,621
Iceland crystal	—	2,720	A piece of dried flesh of fish	—	1,129
Lapis nephriticus	—	2,894	The quill part of a feather	—	1,330
lazuli	—	3,054	5. Of Vegetable Substances.		
hæmatites	—	4,360	Dry box-wood	—	1,030
calaminaris	—	5,000	oak	—	0,925
judaicus	—	2,500	elm	—	0,600
manati	—	2,270	Ash, sappy	—	0,734
amianthus or asbestos, from			Ditto more dry about the heart	—	0,845
Wales	—	2,913	Dry mapple	—	0,755
Ditto from Italy	—	2,360	fir	—	0,546
Glass of the common sort	—	2,666	cedar	—	0,600
Flint	—	2,542	walnut-tree	—	0,631
Black italian marble	—	2,704	yew	—	0,760
White italian ditto	—	2,707	Beech, meanly dried	—	0,854
A fine marble	—	2,700	Crab-tree, meanly dried	—	0,765
Another ditto from Italy	—	2,718	Lignum vitæ	—	1,327
A pellucid pebble	—	2,641	nephriticum	—	1,200
A selenitis	—	2,322	aloes	—	1,177
Mundic, or gold spar	—	4,430	brazilicum	—	1,030
Kidney stone	—	3,600	rhodium	—	1,125
Blue stone	—	2,740	asphaltum	—	1,179
Star stone	—	3,450	guaiaacum	—	1,337
Hard paving stone	—	2,460	Saffraas wood	—	0,482
Burford stone	—	2,049	Red wood	—	1,031
Alabaster	—	1,875	santalum wood	—	1,128
Rag stone	—	2,470	White ditto	—	1,041
Rotten stone	—	1,980	Citrine ditto	—	0,809
Copperas stone	—	4,300	Speckled wood of Virginia	—	1,313
Chalk	—	2,370	Maltic wood	—	0,849
Slate	—	2,740	Ebony	—	1,177
Oil-stone	—	2,380	Good wheat of the last year	—	0,757
A hone	—	2,388	Cork	—	0,240
China	—	2,270	White oats	—	0,472
Piece of brown stone bottle	—	1,777	Blue pease	—	0,795
Piece of white stone mug	—	2,250	White pease very dry	—	0,807
Talc	—	2,657	Barley of the last year	—	0,658
of Venice	—	2,780	Malt made of the same	—	0,485
of Jamaica	—	3,000	Field beans very dry	—	0,807
Armenian hole or earth	—	2,727	Wheaten meal unsifted	—	0,495
Common sea coal	—	1,300	Rye meal unsifted	—	0,454
Magnet, or load-stone of Penfylv-			Wood ashes	—	0,930
vania	—	4,585	6. Of Miscellaneous Substances.		
Piece of stonehenge very hard	—	2,618	Amber	—	1,040
Ditto of a softer sort	—	2,500	Jet	—	1,238
Bristol-stone	—	2,510	Bezoar oriental	—	1,530
4. Of Animal Substances.			occidental	—	1,500
Bone of an ox	—	1,656	Sulphur common	—	1,800
Ivory	—	1,826	vivum	—	2,000
The tip of a rhinoceros's horn	—	1,242	Wood petrified	—	2,341
of an ox-horn	—	1,689	Borax	—	1,720
of a stag's horn	—	1,875	Coral, red	—	2,689
Calculus humanus	—	1,700	white	—	2,500
					Coral-

Corallachates	—	--	2,605
Cinnabar natural	—		7,300
artificial	—		8,200
of antimony	—		6,044
The reputed silver ore of Wales			7,464
The metal thence extracted			11,087
Ceruse	—	--	3,156
Tartar crude	—		1,849
emetic	—		2,246
vitrioli	—		2,298
Cream of tartar	--		1,900
Camphire	—	--	0,996
Mercury crude	—		13,593
distilled once	—		13,570
sublimed 511 times	—		14,110
Glass of antimony	—		5,280
Vitriol of Dantzick	—		1,715
English	—		1,880
white	—		1,900
Sal gemmæ	—		2,143
prunellæ	—		2,148
polychrestum	—		2,141
ammoniacum	—		1,453
Mirabile Glauberi	—		2,246
Salt of hartshorn	—		1,496
Salt of vitriol	—		1,900
Alum	--		1,714
Nitre	---		1,900
Gum arabic	—		1,375
tragacanth	—		1,333
Myrrh	—	--	1,250
Verdigrease	—		1,714
Opium	---		1,363
Litharge of gold	—		6,000
of silver	—		6,044
Bees-wax, yellow	—		0,960
white	—		0,865
Pitch	—	--	1,150
Tutty	—	---	4,615
Honey	—	--	1,450
Rosin	—	---	1,100
Craffamentum of the human blood			1,126
Serum of the human blood			1,030
Piece of petrified bone			1,895
7. Of Fluids.			
Rain-water	—		1,000
Distilled water	—		0,993
Well or spring-water	—		0,999
River-water	—		1,009
Sea-water	—		1,030
Aqua fortis	—		1,300
regia	—		1,234
Oil of vitriol	—		1,700
cloves gilliflowers	—		1,034
amber	—		0,978
anniseed	—		0,994
caraway seed	—		0,940
linseed	—		0,932
mint	—	--	0,975

Oil of olives	—		0,913
orange	—		0,888
origany	—		0,940
rosemary	—		0,934
sassafras	—		1,094
spikenard	—		0,936
turpentine	—		0,792
Spirit of turpentine	—		0,874
wine rectified	—		0,866
Ethereal spirit of wine	--		0,732
Spirit of vitriol	—		1,203
amber	—		1,030
hartshorn	—		1,073
urine	—		1,100
honey	—		0,895
nitre	—		1,315
ditto rectified	—		1,610
sea-salt	—		1,130
tartar	—		1,073
Tincture of antimony	—		0,866
Butter of antimony	—		2,470
Balsam of Tolu	—		0,896
Lixivium of salt of tartar	-		1,550
Burgundy wine	—		0,953
Canary	—		1,033
Red wine from Pontac	-		0,993
White-wine vinegar	—		1,011
Distilled vinegar	—		1,030
Milk of goats	-		1,009
Cow's milk	-		1,030
Urine	-		1,030

Since all bodies are subject to expand with heat, and be condensed with cold, it will follow, that the specific gravities of bodies cannot be precisely the same in summer and winter. This was first observed in experiments by M. Homberg, and after him, by M. Eifenschmid, who found the absolute weight of a cubic inch of several sorts of bodies in summer and winter, as in the table below.

	Summer.			Winter.		
	oz.	dr.	gr.	oz.	dr.	gr.
Brandy	0	4	32	0	4	42
Distilled water	0	5	8	0	5	11
Spring-water	0	5	11	0	5	14
River-water	0	5	10	0	5	13
Spirit of nitre	0	6	24	0	6	44
sea-salt	0	5	49	0	5	55
vitriol	0	5	33	0	5	38
Oil of vitriol	0	7	59	0	7	71
Milk	0	5	20	0	5	25
Mercury	7	1	66	7	2	14
Vinegar	0	5	15	0	5	21
Ditto distilled	0	5	11	0	5	15

**GRAVITY**, in music, an affection of sound, whereby it is denominated deep or low. See the article **SOUND**.

Gravity stands in opposition to acuteness, or that affection of sound whereby it is denominated acute or shrill. See the article **ACUTE**.

The relation of gravity and acuteness is the principal thing concerned in music; the distinctness and determinateness of which relation gives the sound the denomination of harmonical and musical.

The degrees of gravity, &c. depend on the nature of the sonorous body itself, and the particular figure and quantity thereof. Though in some cases on the part of the body where it is struck.

Thus, *e. g.* the sounds of two bells of different metals, of the same shape and dimensions, being struck in the same place, will differ; and two bells of the same metal will differ in sound, if they differ in shape and magnitude, or be struck in different places: so in chords, all other things being equal, if they differ in tension, matter, or dimension, they will always differ in gravity. Thus again, the sound of a piece of gold is much graver than that of a piece of silver of the same shape and dimensions; and in this case the tones are, *cæteris paribus*, proportional to the specific gravities: so a solid sphere of brass, two feet diameter, will sound graver than another of one foot diameter; and here the sounds are proportional to the quantities of the matter, or absolute weights. But it must be observed, that acuteness and gravity, as also loudness and slowness, are but relative things. We commonly call a sound acute, or loud, in respect of another which is grave or low in respect of the former: so that the same sound may be acute and grave, as also loud and low, in different comparisons.

The degrees of acuteness and gravity make the different tones of a voice or sound; so we may say one sound is in tune with another, when they are in the same degree of gravity.

The immediate cause or means of this diversity lies deep. The modern musicians fix it on the different velocities of the vibrations of the sonorous bodies. If two or more sounds are compared in relation of gravity, they are either equal or unequal in the degrees of tune: such as are equal are called unisons, and the unequal constitute what we call an in-

terval in music. See the articles **UNISON**, and **INTERVAL**.

**GRAVY**, in cookery, the juice of dressed meat, whether roasted, fried or boiled. Gravy is obtained from beef, mutton, veal, poultry, and even fish. The gravy of partridges, pullets, and other fowls, may be gotten by pressing them when about half roasted. The gravy of veal, beef, mutton, &c. is thus obtained: cut them in pieces, and putting them into an earthen pot, stop it close by passing the cover that no steam may get out; then set it on a gentle fire, for two hours, and the gravy will be made.

A fish gravy for soup may be made of tench or eels, cleaned, and put into a kettle with water, salt, a bunch of sweet herbs, and an onion stuck with cloves: let these boil for an hour and half; and straining off the liquor, thro' a clean linnen cloth, add to it the peelings of mushrooms, or mushrooms themselves cut small: boil these together, and strain the liquor into a stew-pan, upon fried flour, and a little lemon-juice. This may serve for a foundation to all fish-soups, and will keep good for some time.

**GRAY**, or **GREY**, in the manege, &c. See the article **GREY**.

**GRAY**, in zoology, an animal known among authors, by the name meles. See the article **MELES**.

**GRAY**, in ornithology, a species of duck, called also gadwal. See the articles **DUCK** and **GADWAL**.

**GRAY**, in geography, a city of Franche Compté, in France, twenty-two miles north-west of Besançon: east long.  $5^{\circ} 32'$ , north lat.  $47^{\circ} 30'$ .

**GRAYLING**, in ichthyology, a species of coregonus, with the upper jaw longest, and with twenty-three bones in the back-fin. See the article **COREGONUS**.

**GREASE**, a swelling and gourdiness of the legs of a horse.

If the horse be full of flesh, the cure is to be begun by evacuation, such as bleeding, purging, &c. and keeping his heels as clean as possible, by washing them with warm water and soap; for nothing promotes the grease more than negligence and nastiness. In general, turning out in the day-time, moderate exercise, a large and convenient stall, with good dressing, are the best remedies; but if the grease be got to a great height, and there is a nauseous discharge, after cutting off the hair, and washing the heels with soap and water, bathe them with the follow-

following wound-water, pretty warm, twice a day, for three days. Take rock alum, and white vitriol, of each two ounces; powder them together, and burn them in a clean fire-shovel, till they become a white calx: then take powdered camphire, one ounce; bole armenic in powder, two ounces; river or rain-water, two quarts. Make the water hot, and stir the other things into it. When you use it, it should be shaken up, and a little of it warmed in a pot, and the sores washed with a piece of sponge or rag.

**GREASE, MOLTEN**, a distemper incident to horses, in which the fat is melted by over hard riding or labour. It may be known by the horse's panting at the breast and girding-place, and heaving at the flank, which will be easily seen the night you bring him in, or the next morning.

For the cure, bleed him in the neck vein, to a good proportion; give him dried bran, and if he empties himself, a restraining glyster; but forbear giving him any hot drugs.

**GREASE**, with hunters, the fat of a boar, or hare; but the former has commonly the word bevy added to it, and is called bevy-grease.

**GREAT**, a term of comparison applied to things of extraordinary quantity or quality: thus, we say, a great city, a great genius, &c.

**GREAT CIRCLES** of the sphere. See the article **CIRCLE**.

**GREAT-CIRCLE SAILING**, the manner of conducting a ship in, or rather pretty near the arch of a great circle, that passes thro' the zenith of the two places, *viz.* from whence she came, and to which she is bound. See the article **SAILING**.

**GREAT MEN**, in law books, signify the lords of parliament, or other persons of note and distinction.

**GREAT SEAL**. See the article **SEAL**.

**GREE**, in a legal sense, is used for satisfaction.

**GREECE**, the present Rumelia, and the antient Hellas, is situated between 20° and 26° east long. and between 36° and 44° north lat.

It reaches from the Adriatic Sea, eastward, to the Archipelago, and is generally a healthy and fruitful country.

**GREEK, or GRECIAN**, any thing belonging to antient Greece.

The greek language, as preserved in the writings of the celebrated authors of an-

tiquity, as Homer, Hesiod, Demosthenes, Aristotle, Plato, Xenophon, &c. has a great variety of terms and expressions, suitable to the genius and occasions of a polite and learned people, who had a taste for arts and sciences. In it, proper names are significative; which is the reason that the modern languages borrow so many terms from it. When any new invention, instrument, machine, or the like, is discovered, recourse is generally had to the greek for a name to it; the facility wherewith words are there compounded, affording such as will be expressive of its use: such are barometer, hygrometer, microscope, telescope, thermometer, &c. But of all sciences, medicine most abounds with such terms, as diaphoretic, diagnosis, diarrhoea, hæmorrhage, hydrophobia, phthisis, atrophy, &c. Besides the copiousness and significance of the Greek, wherein it excels most, if not all, other languages, it has also three numbers, *viz.* a singular, dual, and plural; also abundance of tenses in its verbs, which makes a variety in discourse, prevents a certain driness that always accompanies too great a uniformity, and renders that language peculiarly proper for all kinds of verse. The use of the participles of the aorist and preterit, together with the compound words already mentioned, give it a peculiar force and brevity without taking any thing from its perspicuity.

It is no easy matter to assign the precise difference between the modern and antient Greek; which consists in the terminations of the nouns, pronouns, verbs, &c. not unlike what obtains between some of the dialects of the Italian or Spanish. There are also in the modern Greek many new words, not to be met with in the antient. We may therefore distinguish three ages of the greek tongue, the first of which ends at the time when Constantinople became the capital of the roman empire; the second lasted from that period to the taking of Constantinople by the Turks; and the third, from that time to this.

**GREEK BIBLE**. See the article **BIBLE**.

**GREEK CHURCH**. See **CHURCH**.

**GREEK MONKS and NUNS**, of whatever order, consider St. Basil as their founder and common father, and esteem it the highest crime to deviate in the least from his constitutions. There are several beautiful convents with churches, in which the monks perform divine service

day

day and night. Some of the monks are cœnobites, or live together, wear the same habit, eat at the same table, and pursue the same exercises and employments: These are of two sorts; the one of the grand and angelical habit, being such as profess to live more righteously than the rest; the other of the lesser habit, who do not pretend to lead such sanctified lives. Other monks again are anachorets. See the article ANACHORET.

**GREEN**, one of the original colours, excited by the rays of light. See COLOUR. Artificial greens, however, are rarely simple colours, but produced by the mixture of yellow and blue: thus, two powders, one blue and the other yellow, appear perfectly green when mixed; tho' if viewed with a microscope, the mixture will be seen chequered yellow and blue. See YELLOW and BLUE.

The dyers make divers shades, or degrees, of green; all which are first dyed in blue, and then taken down with woad, verdigrease, &c. and afterwards greened with the weed, there being no one ingredient that will dye green alone. See the article DYEING.

**GREEN**, among painters. Gamboge will give five or six sorts of green with verdigrease. But the yellow, which some prefer before all others, is made of french berries; which is either deeper or fainter, according as the liquor is more or less stained by them. In like manner, a yellow, drawn from the roots of the barberry or mulberry, will answer the same purpose, being mixed with transparent verdigrease. As to verdigrease itself, it produces a fine bluish green, flows readily in the pencil, and may even serve as an ink to write with; but is subject to decay. Mountain-green is used for a grass-colour. Verditer is a light green, seldom used but to colour landscapes that seem afar off. Sap-green is dark and dirty, and therefore never used but to shadow other greens in the darkest places. Copper-green is an excellent transparent and shining grass-green, if thickened in the sun-shine, or over a gentle fire. It is the most used of any green in washing of prints or maps.

**GREEN-CLOTH**, a board, or court of justice, held in the compting-house of the king's household, composed of the lord steward, and officers under him, who sit daily. To this court is committed the charge and oversight of the king's household in matters of justice and govern-

ment, with a power to correct all offenders, and to maintain the peace of the verge, or jurisdiction of the court royal; which is every way about two hundred yards from the last gate of the palace where his majesty resides.

It takes its name, board of green-cloth, from a green cloth spread over the board where they sit.

Without a warrant first obtained from this court, none of the king's servants can be arrested for debt.

*Clerks of the GREEN-CLOTH*, are two officers of the board of green-cloth who appoint the diet of the king and his household, and keep all records, ledgers and papers relating thereto; make up bills, parcels and debentures for salaries, and provisions and necessaries for the officers of the pantry, buttery, cellar, &c.

They also wait upon foreign princes when entertained by his majesty.

**GREEN-FINCH**, in ornithology, the english name of the greenish fringilla, with the wings and tail variegated with yellow. See the article FRINGILLA.

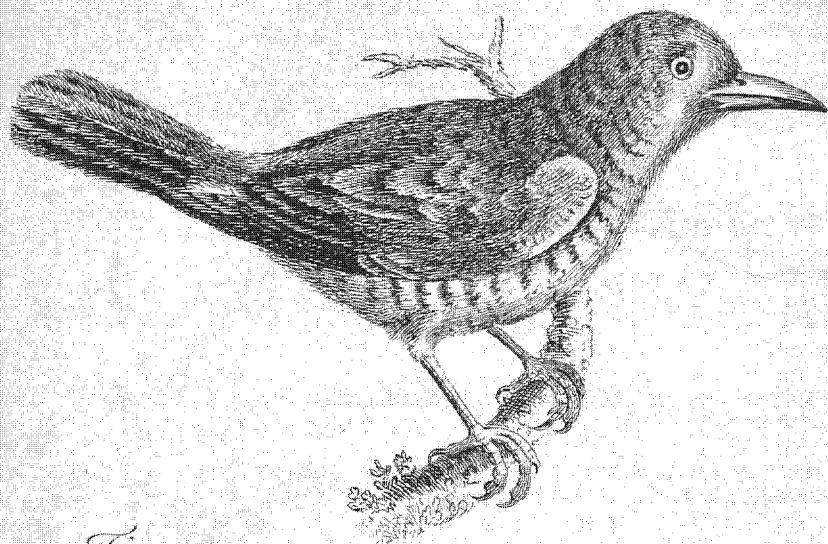
This bird is very frequent with us, and is a little larger than the chaffinch. See Plate CXVIII. fig. 1.

There is also a very beautiful green-finch brought from Surinam, with a red-head, and a roundish yellow spot near the joint of the wing. See *ibid.* fig. 2. where it is figured nearly of the bigness of life.

**GREEN-HOUSE**, or conservatory, a house in a garden contrived for sheltering and preserving the most tender and curious exotic plants, which, in our climate, will not bear to be exposed to the open air during the winter season. These are generally large and beautiful structures, equally ornamental and useful. See plate CXX.

The length of these houses, says Mr. Miller, must be proportioned to the number of plants they are to contain; but their depth should never be greater than their height in the clear; which in small or middling houses may be sixteen or eighteen feet, and in large ones from twenty to twenty-four. The windows in front should extend from about one foot and a half above the pavement, to within the same distance of the ceiling, which will admit of a corniche round the building, over the heads of the windows. In a small green-house, the sashes should not be less than four or five feet broad, and in a large one, they ought not to exceed

*Fig. 1.* The *GREEN GOLD-FINCH*.



*Fig. 2.* The *RED-HEADED GREEN-FINCH*.



*Fig. 3.* *GLYCYRRHIZA Liquorice.*







exceed seven and a half, the shutters of which ought to fall back close to the piers on the inside, that when open, they may not prevent any of the rays of light from reaching the plants. The piers between these windows, which support the building, should be as narrow as possible, for which reason they should either be of stone or of well-burnt brick. If they are of stone, they ought not to exceed two feet and a half in front, and should be sloped off backward to about eighteen inches broad, by which means the rays of the sun will not be obstructed by the corners of the piers; which they would be, if they were square: but if they are built with brick, it will be proper to make them near three feet in front, otherwise, they will be too weak to support the building: these ought also to be sloped off in the manner directed for those of stone.

Over the green-house there may be rooms for drying and preserving seeds, roots, &c. and behind it, there may be erected a house for tools and other purposes; which will prevent the frost from entering that way; so that the wall between them need not be more than two bricks and a half in thickness.

The floor of the green-house, which should be laid either with marble, common stone, or broad tiles, must be raised two feet above the surface of the ground on which the house is placed: or if the situation be moist, at least three feet; and if the whole be arched with low brick arches under the floor, it will be of great service in preventing the damps rising in winter. Under the floor, about three feet from the front, it will be advisable to make a flue of about ten inches in width, and two feet deep, to be carried the whole length of the house, which may be returned along the back part, and the smoke be carried up into funnels adjoining to the tool-house. The fire-place may be contrived at one end of the house; and the door at which the fuel is put in, as also the ash-grate, may be contrived to enter into the tool-house, and the fuel being laid in the same place, the whole will be out of sight. Fires, however, must be very sparingly used in this place: not one winter in three or four will require them to be lighted, since this ought never to be done but when the frost cannot well be kept out any other way, and when this is the case, this expedient may save a whole house of plants. Indeed

the coldest weather cannot make it necessary for the green-house to be shut up close for a long time together, which would be attended with very ill consequences; for as it frequently happens, that in continued frosts, we have an hour or two of sun-shine in the middle of the day, it will be of great service to the plants if they are allowed to enjoy its rays thro' the glasses; but the window-shutters should be closed again as soon as it is clouded. The inside of the house should either be white-washed, or painted white; for this colour reflects the rays of light in a greater quantity than any other.

In this green-house, there should be trussels, upon which rows of planks should be fixed, in order to hold the pots or tubs of plants, the foremost of which should be placed four feet from the window, and the rows behind should rise gradually from the first, in such a manner, that the heads of the second row be entirely advanced above the first, the stems only being hid by it: and at the backside, there should be allowed at least a space of five feet, for the convenience of watering the plants, and admitting a current of air around them: care should also be taken not to place the plants too close to each other, nor ever to place euphorbiums, sedums, torch-thistles, and other tender succulent plants, amongst oranges, myrtles, and other ever-greens.

To avoid the inconvenience of placing plants of very different natures in the same house, it will be very proper to have two wings added to the main green-house, which, if placed in the manner of the annexed plan, will greatly add to the beauty of the building, and also collect a greater share of heat. In this plan the green-house is supposed exactly to front the south, one of the wings to face the south-east, and the other the south-west: so that from the time of the sun's first appearance upon any part of the building, until it goes off at night, it will be constantly reflected from one part to the other, and the cold winds will be also kept off from the front of the main green-house. In the area may be placed many of the tender exotic plants, that will bear to be exposed in the summer season: and in the spring, before the weather will permit the plants to be set out, the beds and borders of this area may be full of anemonies, ranunculuses, tulips, &c.

In the annexed plate A, is the ground plan of the green-house; BB the ground plan of the two stoves. CCC the sheds behind the green-house and stoves. DD the passage of communication between the green-house and stoves, where the stairs are placed which lead to the rooms over the green-house. EE the section of the flues in the back of the stoves, and F is the upright of the green-house and stoves.

In the center of this area may be contrived a small basin for water, which will be very convenient for watering the plants; and the two wings of the building should be so contrived as to maintain plants of different degrees of hardiness, which should be effected by the situation and extent of the fire-place, and the manner of conducting the flues. These wings being, in the draught annexed, allowed sixty feet in length, may be divided in the middle by partitions of glass, with glass-doors, and to each of these there should be a fire-place, with flues carried up against the back-wall. The sloping glasses of these houses should be made to slide and take off, so that they may be drawn down more or less in warm weather, to admit air to the plants; and the upright glasses in front may be so contrived, as that every other may open as doors upon hinges, and the alternate glasses may be divided into two, the upper part of each to be drawn down like sashes, to let in the air.

If there are not sheds running behind the whole length of these wings, the walls should not be less than two bricks thick, and the back part having sloping roofs covered with tiles or slates, should be lined with reeds, &c. under the covering, in order to keep out the cold.

**GREENLAND**, or *West Greenland*, extends from the meridian of London to  $50^{\circ}$  west long. and from  $60^{\circ}$  to  $80^{\circ}$  north lat.

The Danes have some colonies here, and pretend to the property of the whole. However, the Dutch make very free with the fishery on this coast, notwithstanding the representations, and even menaces of the Danes on that head.

*East Greenland*, or *GROENLAND*. See the article *GROENLAND*.

**GREENLAND FISHERY**. See the article *FISHERY*.

**GREENWICH**, a town of Kent, situated on the southern shore of the Thames, five miles east of London; remark-

able for its royal and magnificent hospital, erected for decayed or disabled seamen, who have served their country; and for its palace, and most delightful park. See the article *HOSPITAL*.

On the top of a steep hill in the park, stands the royal observatory, built by Charles II. and furnished with all manner of instruments for astronomical observations, and a deep dry well for observing the stars by day.

**GREGARIOUS**, among zoologists, a term applied to such animals as do not live solitary, but in herds, flocks, or coveys.

**GREGORIAN CALENDAR**, that which shews the new and full moon, with the time of Easter, and the moveable feasts depending thereon, by means of epacts, disposed thro' the several months of the gregorian year. See *CALENDAR* and *EPACT*.

**GREGORIAN CHANT**. See *CHANT*.

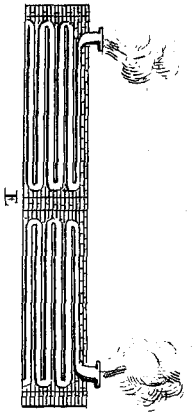
**GREGORIAN EPOCH**, the epocha, or time whence the gregorian calendar or computation took place. The year 1754 is the 172 year of that epocha.

**GREGORIAN YEAR**, the Julian year corrected, or modelled, in such a manner as that three secular years, which in the Julian account are bissextile, are here common years, and only every fourth secular year is made a bissextile year. See the articles *BISSEXTILE* and *YEAR*.

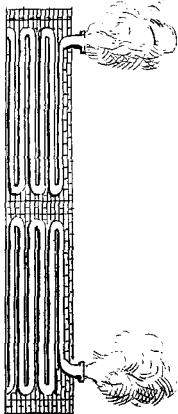
The Julian computation is more than the solar year by eleven minutes, which in one hundred and thirty-one years amounts to a whole day. By this calculation, the vernal equinox was anticipated ten days from the time of the general council of Nice, held in the year 325 of the Christian æra, to the time of pope Gregory XIII. who therefore caused ten days to be taken out of the month of October, in 1582, to make the equinox fall on the twenty-first of March, as it did at the time of that council, and to prevent the like variation for the future he ordered that three days should be abated in every four hundred years by reducing the leap year at the close of each century for three successive centuries to common years, and retaining the leap year at the close of each fourth century only. See *JULIAN* and *EQUINOX*.

This was at that time esteemed as exactly conformable to the true solar year, but it is found not to be strictly just, because that in four hundred years it gets one hour and twenty minutes, and consequently in 7200 years, a whole day.

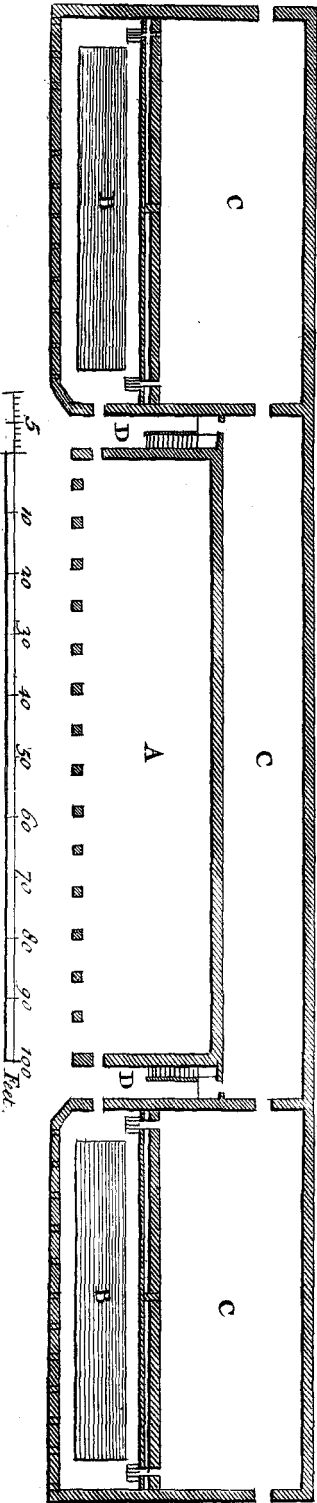
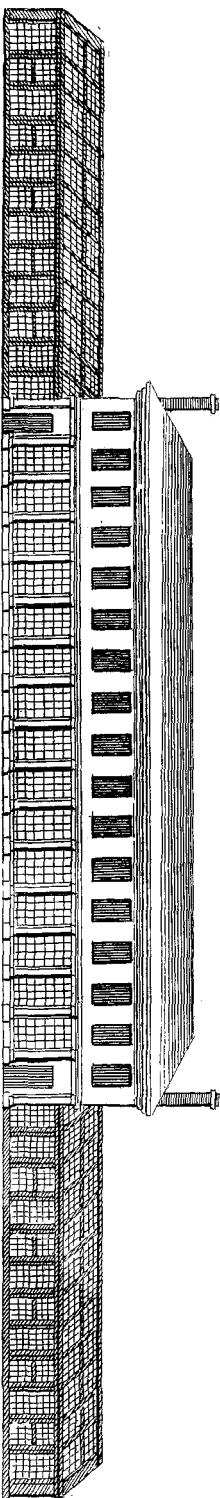
The



A Plan and Elevation of the  
GREEN-HOUSE, &c.



T. Jefferys Sculp.





The greatest part of Europe have long used the gregorian style : but Great Britain retained the julian till the year 1752, when by act of parliament this style was adjusted to the gregorian ; since which time Sweden, Denmark, and other european states, who computed time by the julian account, have followed this example.

**GRENADIER** and **GRENADO**. See the articles **GRANADIER** and **GRANADO**.

**GRENOBLE**, a city of France, capital of Dauphiny, forty-five miles south-east of Lyons, and thirty-six miles south-west of Chamberry : east long.  $5^{\circ} 28'$ , north lat.  $45^{\circ} 12'$ .

**GRENOCK**, or **GREENOCK**, a port-town of Scotland, near the mouth of the river Clyde ; being the principal station for the herring fishery.

**GRESHAM-COLLEGE**. See **COLLEGE**.

**GREVE**, in our antient writers, a denomination of power and authority, signifying as much as *comes*, and *vice comes*, a sheriff ; and according to Lambert, it is the same with *reve*. See the articles **COUNT** and **REVE**.

**GREWIA**, in botany, a genus of the *gynandria-polyandria* class of plants, the corolla whereof consists of five petals, of the form of the cup, but less, and emarginated at the base : the fruit is a quadrangular berry, containing four cells : the seeds are few, and of a globose figure.

**GREWT**, among miners, signifies earth of a different colour from the rest, found on the banks of rivers as they are searching for mines.

**GREY**, or **GRAY**, a mixed colour partaking of the two extremes, black and white. See **COLOUR**.

*To dye a silver GREY*. Take water a sufficient quantity ; of galls bruised small, two ounces ; tartar bruised, three ounces ; boil them, and enter twenty yards of stuff or cloth, &c. handle and boil an hour and a half ; cool it ; then put in copperas a sufficient quantity ; enter your cloth again at a boiling heat ; handle it, boil a quarter of an hour, and so cool ; if you would have it sadder, put in more copperas. See **COLOUR** and **DYEING**.

*To dye a light GREY colour*. Take water a sufficient quantity ; nut-galls bruised small, four ounces ; white tartar bruised small, four ounces ; make them boil, then enter twenty yards of broad-cloth, and handle it ; boiling an hour and half, cool your cloth, and put in copperas an ounce and half ; enter your cloth again,

and handle it ; boil it a quarter of an hour, and cool it ; if you would have it sadder, put in more copperas.

*To dye a dark GREY*. For every pound of woollen ware, use a quarter of a pound of copperas, and a quarter of a pound of brown wood, or walnut-tree wood. To finish it, take two ounces of brown wood, and half an ounce of copperas.

*To dye stuff, &c. a lavender GREY*. Heat a proper quantity of clean rain-water in a kettle, and for every pound of stuff, take an ounce of blue lac, beaten small ; and half an ounce of pounded galls, and the same quantity of vitriol : boil them together, and put in the stuffs ; and boil them for half an hour. This dye is proper for slight ware, as stockings and coarse stuffs, but not for the better sort.

*To dye silk a good GREY*. This you may do as in the tawney dye, and after you have wrung out, rinsed, and beaten it, if it be browned, it becomes a good grey. In the manege, they have several sorts of greys, as the branded-grey, which has spots quite black dispersed here and there ; they have also the dapple-grey, the silver-grey, the iron-grey, &c.

**GREY-FLY**, an insect called by authors oestrum. See the article **OESTRUM**.

**GREY-HOUND**. See the article **HOUND**.

**GRICE**, a term denoting a young wild boar. See the articles **BOAR** and **HOG**.

**GRIFFON**, in heraldry, an imaginary animal, feigned by the antients to be half eagle and half lion ; by this form they intended to give an idea of strength and swiftness joined together, with an extraordinary vigilance in guarding the things intrusted to its care. Thus the heathen naturalists persuaded the ignorant, that gold mines were guarded by these creatures with incredible watchfulness and resolution.

**GRIG**, a name given to the lesser ammodytæ, or sand-eels. See **AMMODYTÆ**.

**GRILLADE**, in cookery, meat broiled on a gridiron.

**GRIMBERG**, a town of the austrian Netherlands, in the province of Brabant, five miles north of Brussels : east long.  $4^{\circ} 15'$ , north lat.  $50^{\circ} 55'$ .

**GRIMPERG**, a city of Germany, in the circle of the lower Rhine, and earldom of Triers : east long.  $6^{\circ} 35'$ , north lat.  $49^{\circ} 40'$ .

**GRIMSBY**, a borough and port-town of Lincolnshire, situated at the mouth of the Humber : east long.  $4'$ , north lat.  $53^{\circ} 34'$ . It sends two members to parliament.

**GRINDERS**, *dentes molares*, in anatomy, &c. See **TEETH** and **MOLARES**.

**GRINDING**, *trituration*, the reducing hard substances to fine powders, either by the mortar, or by way of levigation upon a marble.

Grinding has a great share in some instances of raising or depressing the efficacy of what comes under its management: for in grinding, all those bodies whose efficacy consists in the peculiar shape and points of their component particles, the more and the finer they are broke, the less will they operate. Thus may calomel be rendered much gentler, and made capable of being given in much larger quantities, only by long rubbing in a glass mortar; for the continual triture has the same effect upon it, as repeated sublimation, which is only breaking the saline spicula more and more, until it become almost plain mercury. But in resinous substances, particularly purgative ones, as jalap, scammony, &c. the finer the powder they are reduced to, the greater is likely to be their efficacy: for as the sense which the stomach and bowels have of them is in proportion to their contacts, therefore the more the quantity is divided, the farther will it diffuse itself, and vellicate the fibres; that is, it will work the more.

**GRINDING** is also the rubbing or the wearing off the irregular or otherwise redundant parts of the surface of a body, and reducing it to the destined figure, whether that be flat, concave, or the like.

*Method of GRINDING optic glasses.* Mr. Huygens directs, in general, to make the breadth of the concave tool, plate, dish, or form, in which an object-glass must be ground, almost three times the breadth of the glass. Though in another place he speaks of grinding a glass whose focal distance was 200 feet, and breadth  $8\frac{1}{4}$  inches, in a plate only fifteen inches broad. But for eye-glasses, and others of lesser spheres, the tools must be broader in proportion to the breadth of these glasses, to afford room enough for the motion of the hand in polishing. Mr. Huygens made his tools of copper, or of cast brass, which, for fear they should change their figure by bending, can hardly be cast too thick: however, he found by experience, that a tool fourteen inches broad, and half an inch thick, was strong enough for the forming glasses to a sphere of thirty-six feet diameter; when the tool was strongly cemented

upon a cylindrical stone an inch thick, with hard cement made of pitch and ashes.

In order to make moulds for casting such tools as are pretty much concave, he directs, that wooden patterns should be turned in a lathe, a little thicker and broader than the tools themselves; but for tools that belong to spheres above twenty or thirty feet diameter, he says it is sufficient to make use of flat boards turned circular to the breadth and thickness required. When the plates are cast, they must be turned in a lathe exactly to the concavity required; and for this purpose it is requisite to make a couple of brass-gages in the manner following, according to the directions of Mr. Molyneux.

Take a wooden pole, a little longer than the radius of the spherical surface of the glass to be formed; and through the ends of it strike two small steel points, at a distance from each other equal to the radius of the sphere intended; and by one of the points hang up the pole against a wall, so that this upper point may have a circular motion in a hole or socket made of brass or iron, fixed firmly to the wall. Then take two equal plates of brass or copper, well hammered and smoothed, whose length is somewhat more than the breadth of the tool of cast brass, whose thickness may be about a tenth or a twelfth of an inch, and whose breadth may be two or three inches. Then having fastened these plates flat against the wall in a horizontal position, with the moveable point in the pole, strike a true arch upon each of them. Then file away the brass on one side exactly to the arch struck, so as to make one of the brass edges convex, and the other concave; and to make the arches correspond more exactly, fix one of the plates flat upon a table, and grind the other against it with emery. These are the gages to be made use of in turning the brass tools exactly to the sphere required.

But if the radius of the sphere be very great, Mr. Huygens directs the gages to be made as follows. Imagine the line AE, (plate CXIX. fig. 4. n<sup>o</sup> 1.) drawn upon the brass plate to be the tangent of the required arch AFB, whose radius, for example, is 36 feet, and diameter 72. From A set off the parts AE, EE, &c. severally equal to an inch, and let them be continued a little beyond half the  
breadth

breadth of the tool required: then as 72 feet, or 864 inches is to 1 inch, so let 1 inch be to a fourth number: this will be the number of decimal parts of an inch in the first line EF, reckoning from A. Multiply this fourth number successively by 4, 9, 16, 25, &c. the squares of 2, 3, 4, 5, &c. and the several products will be the number of parts contained in the 2d, 3d, 4th, 5th, EF respectively. But because these numbers of parts are too small to be taken from a scale by a pair of compasses, subtract them severally from one inch, represented by the lines EG, and the remainders being taken from a scale of an inch divided into decimal parts, and transferred by the compasses from G to F, will determine the points F, F, &c. of the arch required. And the same being done on the other side of the line AD, the brass plates must be filed away exactly to the points of this arch, and polished as before.

Mr. Huygens would have his plates or tools first formed in a turning lathe, and then ground together with emery; that is to say, the concave and convex tool of the same sphere together: but the tools of very large spheres, he would have ground at first quite plane, by a stone-cutter; and then ground hollow with a round flat stone and emery, to the desired gage.

The tools thus ground must be polished by an incrustation of pitch and emery, and perfected with blue hones. See the article POLISHING.

The glass being planed to an equal thickness, and polished a little by a glass grinder, and rounded by a grind-stone, take away the plate with several steel cavities, and with some sifted emery, made into a cement, fix on a smaller round piece of brass, or rather steel, truly flat, and turned, about the bigness of a farthing, but thicker, having first made in the center thereof, with a triangular steel punch, a hole about the bigness of a goose-quill, and about the depth of  $\frac{1}{12}$  of an inch; and at the very bottom of this triangular hole, a little round hole must be punched somewhat deeper, with a very small steel punch. A small steel point, of about an inch long, must be truly shaped and fitted to this triangular hole, and at the very apex to the small round deep impression. Nevertheless it must not be fitted so exactly, but that it may have the liberty to move a little to

and fro; and the apex always continuing to press upon the surface of the round hole below. This steel triangular point must be fixed to the end of a pole; to the other end of which another round iron point must be fixed, of about five or six inches long, to play freely up and down in a round hole in a piece of brass let into a board fixed against the ceiling for that purpose, perpendicularly over the bench and over the center of the tool, which must be strongly and truly fixed horizontally thereon, as represented in plate CXIX. fig. 4. n<sup>o</sup> 2.

Having these things prepared, with some pots of emery of various finenesses, take of your roughest sort a small half pugil, wetting the same, and daubing it pretty equably on the tool; then lay on your glass, and fix up your pole, and continue to grind for a quarter of an hour; not pressing upon the pole, but barely carrying the glass round thereby: then take a little quantity of some finer emery, and work another quarter of an hour therewith: then take the like quantity of emery still finer, and work for the same time: last of all take a less quantity of some of the very finest you have, which will be sufficient for a glass of five inches diameter, and work therewith for an hour and a half; taking away by little and little some of the emery with a wet sponge. Do not keep it too wet nor too dry, but about the consistence of paper for much depends on this. If it be too dry, your emery will stick, clog, and incorporate, and cut little or none at all, besides it will scratch and cut your glass irregularly; and if it is too wet, and too much diluted, it will, from the irregular separation of its parts, cut in some places more than others, as in the other case.

But Mr. Huygens tells us, that this method of using various sorts of fresh emery is not good; finding by experience, that the surfaces of large glasses are often scratched. And therefore he says, that it is best to take a large quantity of the first and second emery, and so work with the same from the first to the last, taking away, by little and little, every half hour, or quarter of an hour, more and more of the emery with a wet sponge, by which means he could bring the glass extremely smooth and fine, so as to see pretty distinctly a candle or the sash-windows well defined through it, which is a mark when it is ground enough to receive a polish.

When you first begin to grind, and the  
9 F 2 emery

emery begins to be smooth, the glass will stick a little to the tool, and run stiff; then fresh emery is to be added. The method hitherto described of grinding with emery, is what is recommended by Mr. Huygens. Le Pere Cherubin prescribes another material, which is the grit of a hard grind-stone, well beaten into a fine powder, and sifted pretty fine: and here in England the same thing was used to be performed by Mr. Cox with common clean white sand, taking away by little and little the said grit and sand, as it is ground finer and finer; but it seems this method is now quite disused.

*The method of GRINDING plate-glass.* See the article GLASS.

**GRINDSTEAD**, or *East GRINSTEAD*, a borough-town of Suffex, twenty-four miles directly south of London, which sends two members to parliament.

**GRIPE**, or **GRIPEs**, in medicine, a sort of colic, or painful disorder of the belly. See the article COLIC.

**GRIPE**, or **GRIP**, in husbandry, a small ditch cut across a meadow, or plowed land, in order to drain it.

**GRIPE**, in the sea-language, is a piece of timber fayed against the lower piece of the stern, from the fore-mast end of the keel, joining with the knee of the head: its use is to defend the lower part of the stern from any injury; but it is often made the larger, to make the ship keep a good wind.

Gripe of a ship, is also the compass or sharpness of the stern under water, chiefly towards the bottom of it.

Gripe is also a sea-term, for a ship's turning her head more to the wind than she should; this is caused either by overloading her a-head, the weight of which presses her down, so that the will not readily fall off from the wind; or by staying or setting her masts too much aft: which is always a fault in short ships that draw much water, since it causes them to be continually running into the wind: though in floating ships, if the masts be not stayed very far aft, they will never keep a good wind.

**GRIPSWALD**, a town of Germany, in the circle of Upper Saxony, and province of Swedish Pomerania, situated on a bay of the Baltic sea: east long.  $13^{\circ} 40'$ , north lat.  $54^{\circ} 15'$ .

**GRISLAGINE**, in ichthyology, a species of cyprinus, with whitish fins, and eleven rays in that beside the anus.

**GRISLEA**, in botany, a genus of the *oëandria-monogynia* class of plants, the flower of which consists of four extremely minute petals, of an oval figure, arising from the denticulations of the cup, and scarce larger than they. It is an american tree, sufficiently distinguished by its flower alone.

**GRISONS**, allies of Switzerland; their country is almost of a circular form, about sixty miles over every way, and is bounded on the north by Tyrol and part of Switzerland; on the east, by Tyrol and Trent; on the south, by Italy; and by the Swiss cantons on the west.

**GRIST**, in country-affairs, denotes corn ground; or ready for grinding. See the articles CORN and MILL.

**GRITH**, a faxon word signifying peace; from whence grithbreche is used in law-books for the breach of the peace.

**GROANING**, or **HOOTING**, among sportsmen, the cry or noise of a buck in rutting time.

**GROAT**, an english money of account, equal to four-pence.

**GROATS**, in country-affairs, oats after the hulls are off, or great oat-meal.

**GROCERS**, antiently were such persons as engrossed all merchandize that was vendible; but now they are incorporated, and make one of the companies of the city of London, which deals in sugar, foreign fruits, spices, &c.

**GRODNO**, a great city of Poland, in the province of Lithuania: east long.  $24^{\circ}$ , north lat.  $51^{\circ} 40'$ .

**GROENDALE**, a town of Brabant, six miles south-east of Brussels.

**GROENLAND**, or **SPITZBERGEN**, a cold miserable country without inhabitants, and with very few animals or vegetables, situated between  $10^{\circ}$  and  $30^{\circ}$  east long: and between  $77^{\circ}$  and  $82^{\circ}$  north lat.

**GROGRAM**, a kind of stuff, made of silk and mohair. Turkey programs pay on

importation  $8\frac{66\frac{1}{2}}{100}$  d. the yard; and draw

back, on being exported,  $7\frac{50\frac{3}{4}}{100}$  d. Lisle

programs, if narrow, pay 11 s.  $6\frac{60}{100}$  d. each piece, not exceeding 15 yards, and draw back 10 s.  $1\frac{1}{2}$  d. but if broad they pay 17 s.  $3\frac{90}{100}$  d. and draw back 15 s.  $2\frac{25}{100}$  d. each piece, not exceeding 15 yards.

**GROIN**, *pubes*, in anatomy. See the article PUBES.

**GROLL**, a town of Guilderland, twenty-one miles east of Zutphen.

**GROMETS**,



**GROMETS**, in the sea-language, small rings formerly fastened with staples to the yards, to make fast the gaskets, but now never used.

**GRONINGEN**, the capital of a province of the same name, which makes one of the seven united provinces: east long.  $6^{\circ} 40'$ , north lat.  $53^{\circ} 20'$ .

**GRONOVIA**, in botany, a genus of the *pentandria-monogynia* class of plants, the flower of which consists of five extremely small petals, of a roundish figure: the fruit is a roundish, coloured capsule, with only one cell, in which is contained a single, large, and roundish seed.

**GROOM**, a name particularly applied to several superior officers belonging to the king's household, as groom of the chamber, groom of the stole. See the articles **STOLE** and **WARDROBE**.

**GROOM-PORTER**, an officer of the king's household, who provides chairs, stools, and firing for the king's lodging, and also furnishes cards, dice, &c. and decides the disputes which arise at play.

**GROOM** is more particularly used for a servant appointed to attend on horses in the stable. It is his business to feed and water them, to curry and rub them down, and to keep a watchful eye over them, that they may have no inward or outward disorder, without his discovering it, and using his endeavours to remove it.

**GROOVE**, among miners, is the shaft or pit sunk into the earth, sometimes in the vein, and sometimes not.

**GROOVE**, among joiners, the channel made by their plough in the edge of a moulding, style, or rail, to put their pannels in, in wainscoting.

**GROOVE** also denotes a gardener's tool for transplanting plants.

**GROSS**, in law-books, signifies absolute or independent on another: thus, an advowson in gross, is one distinct and separate from the manor.

**GROSS** also denotes the quantity of twelve dozen, of things sold by tale.

**GROSS-BEAK**, in ornithology, the english name of a bird called by authors *loxia*. See the article **LOXIA**.

**GROSS-WEIGHT**, the whole weight of merchandizes, with their dust and dross; as also the bag or chest wherein they are contained. An allowance is usually made out of the gross-weight for tare and tret. See the article **TARE**.

**GROSSE-BOIS**, in our old law-books, signifies wood of such a growth as to be accounted timber. See **TIMBER**.

**GROSSETTA**, a city of Tuscany, in Italy, fifty-five miles south of Florence: east long.  $12^{\circ}$ , north lat.  $42^{\circ} 40'$ .

**GROSSULARIA**, the **GOOSEBERRY** and **CURRENT-BUSHES**, the same with the *ribes* of Linnaeus. See the articles **RIBES**, **GOOSEBERRY**, &c.

**GROTESQUE**, or **GROTESK**, in sculpture and painting, something whimsical, extravagant, and monstrous; consisting either of things that are merely imaginary, and have no existence in nature; or of things so distorted, as to raise surprise and ridicule.

Grotesque work is the same with what is sometimes called antique. The name is said to have taken its rise from the figures of this kind much used in adorning the grottos which in antient times were the tombs of eminent persons or families; such as that of Ovid, whose grotto was discovered near Rome about eighty years ago.

**GROTESQUES**, or **GROTESKS**, are particularly used to signify those fanciful ornaments of animals interspersed among foliages, fruit, &c. as those painted by Raphael Urbin in the Vatican, and those carved by Michael Angelo, in the ceiling of the portico of the capitol. These kind of compartments are called by Vitruvius, *harpagenituli*.

**GROTSKA**, a city of Silesia, and capital of a dutchy of the same name, thirty miles south of Breslaw: east long.  $17^{\circ}$ , north lat.  $50^{\circ} 40'$ .

**GROTSKA** is also a town of Servia, in european Turkey, twenty miles south-east of Belgrade: east long.  $21^{\circ}$ , north lat.  $45^{\circ}$ .

**GROTTO**, in the natural history of the earth, a large deep cavern or den in a mountain or rock.

Of these we find several remarkable ones in different parts of the world. The most celebrated one of our own country, is that called Oookley-hole, on the south side of Mendip-hills. Its length is about two hundred yards, and its height various; being in some places very low, and in others eight fathoms. There is another at Puzzoli, about four leagues from Naples, called the dog's grotto; because a dog thrown into it is immediately killed, by a destructive vapour equally fatal to all animals within its reach. The milky grotto, *crypta lactea*, about a mile from the antient village of Bethlehem, is said to have been thus called from the holy virgin's letting fall some drops of her milk in it; on which  
account

account the earth of this cavern has been supposed to possess the virtue of restoring womens milk.

**GROTTO** is also used for a small artificial edifice made in a garden, in imitation of a natural grotto.

The outsidcs of these grottos are usually adorned with rustic architecture, and their inside with shell-work, coral, &c. and also furnished with various fountains, and other ornaments.

The following is recommended as a good cement for grotto-work. Take two parts of white rosin, melt it clear, add to it four parts of bees-wax; when melted together, add some flower of the stone you design to cement, two or three parts, or so much as will give the cement the colour of the stone; to this add one part of the flower of sulphur: first incorporate all together over a gentle fire, and afterwards knead it with your hands in warm water. With this fasten the stones, shells, &c. after they are well dried, and warmed before the fire.

**GROVE**, in gardening, a small wood impervious to the rays of the sun.

Groves are not only great ornaments to gardens, but are also the greatest relief against the violent heats of the sun, affording shade to walk under in the hottest parts of the day, when the other parts of the garden are useless; so that every garden is defective which has not shade. See the article **GARDEN**.

Groves are of two sorts, *viz*, either open or close. Open groves are such as have large shady trees which stand at such distances, as that their branches approach so near to each other, as to prevent the rays of the sun from penetrating through them.

Most of the groves that have been planted either in England or in the celebrated gardens of France, are only a few regular lines of trees; many of which are avenues to the habitation, or lead to some building or other object: but these do not appear so grand, as those that have been made in woods, where the trees have grown at irregular distances: where they have large spreading heads, and are left so far asunder, as to permit the grass to grow under them, they then afford the greatest pleasure; for nothing is more noble than fine spreading trees, with large stems, growing through grass, especially if the grass is well kept, and has a good verdure; besides, most of those

planted groves have a gravel walk, made in a straight line between them, which greatly offends the sight of persons who have a true taste: therefore whenever a gravel-walk is absolutely necessary to be carried through these groves, it will be much better to twist it about, according as the trees naturally stand, than to attempt regularity: but dry walks, under large trees, are not so useful as in open places; because after rain, the dropping of the trees will, for a considerable time, render the walks useless.

In planting groves, it is much the best way to dispose the trees irregularly, which will give them a more magnificent and noble appearance, and also form a shade sooner than when the trees are planted in lines.

When, in planting a garden, full grown trees are found upon the spot, they should, if possible, remain inviolate; for it will be better to put up with many inconveniences, than to destroy what will require an age to retrieve; so that nothing but offending the habitation, by being so near as to occasion great damps, should tempt us to cut them down.

Close groves have frequently large trees standing in them; but the ground under these are filled with shrubs or underwood; so that the walks which are in them are private, and screened from winds; by which means they are rendered agreeable for walking, at such times when the air is either too hot or too cold for walking in the more exposed parts of the garden. These are often contrived so as to bound the open groves, and frequently to hide the walls or other inclosures of the garden; and when they are properly laid out, with dry walks winding through them, and on the sides of these sweet-smelling shrubs and flowers irregularly planted, they have a charming effect: for here a person may walk in private, sheltered from the inclemency of cold or violent winds, and enjoy the sweets of the vegetable kingdom: therefore, when it can be admitted, if they are continued round the whole inclosure of the garden, there will be a much greater extent of walk; and these shrubs will appear the best boundary, where there are not fine prospects to be gained.

**GROUND**, in agriculture, is much the same with earth or soil. See the articles **EARTH** and **SOIL**.

**GROUND**,

**GROUND**, in painting, the surface upon which the figures and other objects are represented.

The ground is properly understood of such parts of the piece, as have nothing painted on them, but retain the original colours upon which the other colours are applied to make the representations.

A building is said to serve as a ground to a figure, when the figure is painted on the building.

The ground behind a picture in miniature, is commonly blue or crimson, imitating a curtain of sattin or velvet; if it be to be blue, it should be laid on as follows: wash bice till it is very pure and clear, and temper a quantity in a shell sufficient for your ground, letting it be thoroughly moist and well bound with gum. Then with a small pencil lay on the same colour about the profile, that is, the ambient superficies of the picture; having done this, take a large pencil, and wash over the whole ground you design to cover with a blue, somewhat thin and waterish, and then with a pretty large pencil, full of colour and flowing, lay over with a thick and substantial colour what you had before only washed over; in the doing of this you must be very quick, keeping the colour you have laid on moist, and not suffering any part to dry till you have covered the whole.

If you would have your ground a crimson like sattin, then trace out where and in what places you will have those strong and hard lights and reflections to fall, which are seen in sattin or velvet, with indian lake; there lay your lights with a lake that is thin and waterish, and while it is yet wet, lay the deepening and hard strong shadows with a stronger and darker colour of lake thick ground, close by the other lights. The best way for imitation, is to have a piece of sattin before you to imitate.

**GROUND**, in etching, denotes a gumous composition smeared over the surface of the metal to be etched, to prevent the aquafortis from eating, except in such places where this ground is cut through with the point of a needle. See the article **ETCHING**.

**GROUND of a shield**, the same with field. See the article **FIELD**.

**GROUND-ANGLING**, fishing under water without a float, only with a plumb of lead or a bullet, which is better, because it will roll on the ground; this method

of fishing is most proper in cold weather, when the fish swim very low.

The bullet is to be placed about nine inches from the baited hook. A person in fishing in this manner, ought not to strike as soon as he feels the fish bite, but slack his line, that the fish may the better swallow the bait and hook. As for the tackle, it should be fine and slender; for strong and thick lines only serve to fright the fish.

The morning and evening are the chief seasons for the ground-line in fishing for trout; but if the day prove cloudy, or the water muddy, you may fish at ground all day.

**GROUND-PLUMBING**, is to find out the depth of the water in fishing; which is done by a musket-bullet with an hole through it, tied to a strong twist and hung on the hook.

**GROUND-IVY**, *hedera terrestris*, in botany. See the article **GLECHOMA**.

Ground-ivy is attenuant and dissolvent, and famous both internally and externally as a vulnerary. It is much used with us in an infusion in form of tea, for disorders of the breast and lungs, and is sometimes an ingredient in pectoral decoctions. A conserve made of the plant when in flower, retains its virtues in an agreeable form, but is seldom kept in the shops. It is esteemed a specific in crosions and exulcerations of the viscera, and particularly of the kidneys and lungs. It is also recommended in consumptions, bruises from falls, head-achs, and other the like disorders.

**GROUND-PINE**, in botany, a plant called by authors *chamæpitys*, or *teucrium*. See the article **TEUCRIUM**.

*Stinking* **GROUND-PINE**, in botany. See the article **POLYCNEMUM**.

**GROUND-TACKLE**, is a ship's anchors, cables, &c. and, in general, whatever is necessary to make her ride safe at anchor.

**GROUND-TIMBERS**, are those timbers in the ship which lie on her keel, and are fastened to it with bolts thro' the keelson. They are so called from the ship's resting upon them when she is aground.

**GROUND-TOWS**, are what comes from the hemp when dressed at the hatchel for the spinners, and out of which ham-burgh or cabin-lines, marlin, and white ocham are made.

**GROUND-WORK**, in a building, the same with foundation. See **FOUNDATION**.

**GROUND-**

**GROUNDAGE**, a custom or tribute paid for the ground on which a ship stands in port.

**GROUNDING**, is bringing a ship on ground to be cleaned, trimmed, or to have a leak stopped.

**GROUNDLING**, in ichthyology, the smooth, spotted cobitis, with the body of a cylindrical figure, and otherwise called the loach. See **COBITIS**.

**GROUNDSEL**, *erigeron*, in botany, &c. See the article **ERIGERON**.

**GROUP**, in painting and sculpture, is an assemblage of two or more figures of men, beasts, fruits, or the like, which have some apparent relation to each other.

It is necessary in a good piece of painting, that all the figures be divided into groups: this has somewhat in it of the nature of symphony or concert of voices; for as in the one the voices must sustain each other, in order to fill the ear with an agreeable harmony from the whole; so in groups, if the parts or figures be not well disposed, something will be found disagreeable.

There are two kinds of groups, or two manners of considering them, with respect to the design, and to the clair-obscur. The first of these is common both to works of painting and sculpture; but the latter is peculiar to painting.

Groups, with respect to the design, are combinations of several figures, which bear a relation to each other, either upon account of the action, or of their proximity, or of the effect they produce. These we conceive as representing so many different subjects, or at least so many distinct parts or members of one great subject. Thus, in architecture, we say a group of columns, when we speak of three or four columns standing together on the same pedestal.

Groups, with respect to the clair-obscur, are assemblages of figures, where the lights and shadows are diffused in such a manner, that they strike the eye together, and naturally lead it to consider them in one view.

**GROUP**, in music, one of the kinds of diminutions of long notes, which, in working, form a sort of group, knot, or bush. It usually consists of four or more crotchets, quavers, &c. tied together at the discretion of the composer.

**GROUPADE**, or **CROUPADE**, in the manege. See the article **CROUPADE**.

**GROUPED COLUMN**. See **COLUMN**.

**GROUSE**, or **GROUSE**, a species of the tetrao, is a valuable bird of the size of a well-grown fowl; the head is large; the eyes bright and piercing; the ears are patulous, the beak is three quarters of an inch long, and of a pale colour, somewhat hooked, and pointed at the extremity: it has a scarlet protuberance over the eyes, which is very bright and beautiful; its wings are variegated, and its tail forked. The male, excepting the little variegations of white in his wings, is totally black, and there is a fine changeable tinge of a deep blue on his neck; but the female is brown and mottled, and in colour resembles the woodcock.

This a native of England, but is not very frequent; it lives on large mountainous heaths.

**GROWAN**, among the miners of Cornwall, a coarse gritty stone, of a greyish colour, which they are often obliged to dig through, before they can reach the ore.

**GROWTH**, the increase of a thing, or its advancing towards maturity.

**GROWTH-HALF-PENNY**, a rate paid in some places for the tithes of every fat beast, or other unfruitful cattle.

**GROYNE**, or **CORUNNA**, a port of Spain. See the article **CORUNNA**.

**GRUARI**, in law-books, in general, signifies the principle officers of a forest.

**GRUB**, in zoology, the english name of the hexapode worms, produced from the eggs of beetles, and which at length are transformed into winged insects of the same species with their parents. See the article **SCARABÆUS**.

**GRUBS**, in medicine, certain unctuous pimples arising in different parts of the face, but chiefly in the alæ of the nose. The cure of these ought only to be attempted by evacuations and cleansers of the blood.

**GRUBBING**, in agriculture, the digging or pulling up the stubs and roots of trees.

When the roots are large, this is a very troublesome and laborious task; but Mr. Mortimer has shewn how it may be accomplished so as to save great expence by a very simple and easy method. He proposes a strong iron-hook to be made, about two feet four inches long, with a large iron-ring fastened to the upper part of it. See plate CXXI. fig 2. This hook must be put into a hole on the side of the root, to which it must be fastened, and a lever being put into the ring, two or three

three men, by means of this lever, may wring out the root, and twist the sap-roots asunder. Stubs of trees may also be taken up with the same hook, in which work it will save a great deal of labour, though not so much as in the other, because the stubs must be first cleft with wedges before the hook can enter the sides of them, to wrench them out by pieces.

**GRUBBING a cock**, with cock-fighters, a term used for cutting off the feathers under his wings.

This is a thing not allowed by cockpit-law, nor is any one permitted to cut off the feathers in any handling place.

**GRUBENHAGEN**, a town and castle of lower Saxony and dutchy of Brunfwic, remarkable for its mines of silver, copper, iron, and lead: east lon.  $9^{\circ} 36'$ , and north lat.  $51^{\circ} 45'$ .

**GRUINALIS**, in botany, the same with geranium. See the article **GERANIUM**.

**GRUME**, *grumus*, in medicine, denotes a concreted clot of blood, milk, or other substance. Hence grumous blood is that which approaches to the nature of grume, and by its viscosity, and stagnating in the capillary vessels, produces several disorders.

**GRUMOSE ROOTS**, among herbalists, such as are knotty, and fastened to one head, like those of celandine and anemones. See the article **ROOT**.

**GRUNDULUS**, the **GROUNDLING**. See the article **GROUNDLING**.

**GRUS**, the **CRANE**, in ichthyology, a bird of the ardea or heron-kind. See the article **ARDEA**.

The common crane, or ardea with the top of the head papillose, is a large, stately, and beautiful bird, with a very long neck. The indian crane, with the whole upper part of the head papillose, is smaller than the european or common kind, but otherwise very like it. See the article **CRANE**.

**GRUS**, in antiquity, a kind of dance which the young Athenians performed every year at Delphos, about the altar of Apollo, on the day of Delia.

The steps and figures of this dance, which were intricate and running one into another, were designed to express the turnings and windings of the labyrinth in which Theseus killed the minotaur.

**GRY**, a measure containing one tenth of a line. See the article **LINE**.

**GRYGALLUS**, in ornithology, a name given to the urogallus, or tetrao. See the article **TETRAO**.

**GRYLLO-TALPA**, the **MOLE-CRICKET**, a species of gryllus, with the anterior feet palmated. See the next article.

This is the largest of all the european winged insects, being two inches and a half in length, and three quarters of an inch in diameter. Its colour is a dusky-brown, and there grow from the extremity of the tail, on each side, two hairy bodies resembling in some degree the tail of a mouse. See plate **CXXI**. fig. 4.

**GRYLLUS**, in zoology, the name of the cricket and locust-kind, which, together with the grasshoppers, make only one genus of insects, the characters of which are these: the antennæ are setaceous; the exterior wings are membranaceous, narrow, and have much of the appearance of the wings of some of the fly-kind; the thorax is compressed and angulated; and the legs are formed for leaping. See the articles **LOCUST** and **GRYLLO-TALPA**.

**GRYLLUS**, in ichthyology, a name given to two distinct fishes, the conger-eel and ophidion. See the articles **CONGER** and **OPHIDION**.

**GRYPHITES**, in natural history, in english **CROW'S STONE**, an oblong fossil shell, very narrow at the head, and becoming gradually wider to the extremity, where it ends in a circular limb; the head or beak of this is very hooked or bent inward.

They are frequently found in our gravel or clay-pits, in many counties. There are three or four distinct species of them; some are extremely rounded and convex on the back, others less so; and the plates of which they are composed, are in some smaller and thinner, in others thicker and larger, in specimens of the same bigness. See plate **CXXIV**. fig 2.

**GRYPHUS**, a kind of ænigma. See the article **ÆNIGMA**.

**GUADALAJARA**, a city of Mexico, in north America, and the capital of Guadalajara, or New Galicia: west lon.  $108^{\circ}$ , and north lat.  $20^{\circ} 45'$ .

**GUADALAVIAR**, a river of Spain, which rises in the province of Arragon, and runs south-east through the province of Valencia, falling into the Mediterranean a little below the city of Valencia.

**GUADALAXARA**, a city of Spain, in the province of New Castile, twenty-eight miles north-west of Madrid: west long.  $3^{\circ} 50'$ , and north lat.  $40^{\circ} 40'$ .

**GUADALUPE**, one of the largest of the Caribbee-islands, eighty miles north of

Martinico, subject to France : west lon. 61°, and north lat. 16° 30'.

**GUADARAMA**, a town of New Castile, in Spain, twenty-three miles north-west of Madrid : west lon. 4° 45', and north lat. 40° 45'.

**GUADIANA**, a river of Spain, which rises in the middle of New Castile, and running through Estremadura, enters Portugal; where passing through the provinces of Alentejo and Algarva, it discharges itself into the Atlantic ocean.

**GUADILBARBAR**, a river of Africa, which rises in the mountains of Atlas, runs through the kingdom of Tunis, and falls into the Mediterranean sea near Bona.

**GUADILQUIVIR**, a river of Spain, which rises in the mountains of Segura, in New Castile, runs the whole length of Andalusia, and passing by Cordova and Seville, falls into the Atlantic ocean at St. Lucar.

**GUADIX**, a city of Spain, in the province of Granada : west long. 3°, and north lat. 37° 15'.

**GUADUM**, in botany, a name sometimes given to isatis or woad. See **ISATIS**. The same term is also used for the genistella tinctoria, or dyer's weed.

**GUAJAC**, *guajacum*, in botany and medicine. See the article **GUAJACUM**.

**GUAJACANA**, in botany, a plant otherwise called diospyros.

**GUAJACUJA**, the same with the lophius. See the article **LOPHIUS**.

**GUAJACUM**, or **GUAIACUM**, in botany, a genus of the *decandria-monogynia* class of plants, the flower of which consists of five ovato-oblong patent petals, whereof the superior ones are least; the fruit is a roundish obliquely acuminate drupe, furrowed on one side; and the seeds are oval nuts, covered with pulp. The wood of guajacum is extremely hard and solid, of a dense, compact texture, and remarkably heavy; it consists of two parts, a central matter, or heart, and an exterior one, or blea : the central part is extremely hard and ponderous, and is of a greenish colour, or else it is variegated with a pale or whitish colour, a dusky green, and a brownish with the black : the external part is of the colour of box-wood; but when we see the fragments of the branches of the tree entire, it is covered with a thin strong bark. The wood is of a fragrant smell, and of an aromatic and pungent, but somewhat bitterish taste.

Guaiacum is attenuant and aperient : it promotes the discharges by sweat and urine, and strengthens the stomach and the other viscera. It is an excellent medicine in obstructions of the liver and spleen, in the jaundice, dropsy, and many other chronic cases, and gives relief in the rheumatism, and even in the gout.

The bark is a more powerful attenuant than the wood, but it is less proper for people of a feverish disposition. Neither of them are given much in substance, the usual way being in decoction with saffras, and other medicines of the same intention.

Besides the wood and the bark, we have a resin of it, under the improper name of gum-guaiacum. This is a solid but very friable substance, much resembling common resin, except in colour, it being of a dusky greenish hue, and sometimes, though less frequently, of a reddish colour. It is very acrid and pungent to the taste, and when burnt, smells like guaiacum wood. It is given in the same cases with the wood, and the famous balsamum polychrestum is made of it.

**GUAJAVA**, in botany, the name by which Tournefort calls the psidium of Linnæus. See the article **PSIDIUM**.

**GUAINUMBI**, the HUMMING-BIRD. See the article **HUMMING-BIRD**.

**GALEOR**, a city of the hither India, and the capital of the province of Galeor, situated forty miles south of Agra : east lon. 79°, and north lat. 26°.

**GUAM**, the chief of the Ladrone-islands, in the Pacific ocean : east lon. 140°, and north lat. 14°.

**GUAN**, or **QUAN**, an american bird, a little bigger than the common hen. In shape it somewhat resembles a turkey, to which Mr. Edwards takes it to be near of kin. The top of the head is covered with black feathers, which it can erect into a crest : the upper part of the body is of a dark colour, and the neck, breast, and belly are of the same colour, only spotted with white. See plate CX. fig. 3.

**GUANABANUS**, in botany, the name by which Plumier calls the anona. See the article **ANONA**.

**GUANIHANI**, or **ST. SALVADOR**, now called Catt-island, one of the Bahama-islands in the Atlantic ocean, in north America : west lon. 76°, north lat. 24°.

**GUANUCO**, a town of Peru, in south America, one hundred and eighty miles north east

north-east of Lima: west lon.  $75^{\circ} 15'$ . and south lat.  $10^{\circ}$ .

**GUAPERVA**, in ichthyology, a name given to several species of balistes. See the article **BALISTES**.

**GUARANTY**, in matters of polity, the engagement of mediatorial or neutral states, whereby they plight their faith, that certain treaties shall be inviolably observed, or that they will make war against the aggressor.

**GUARANTY**, or **WARRANTY**, in law. See the article **WARRANTY**.

**GUARD**, in a general sense, signifies the defence or preservation of any thing; the act of observing what passes, in order to prevent surprize; or the care, precaution, and attention we make use of, to prevent any thing happening contrary to our intention or inclinations.

**GUARD**, in the military art, is a duty performed by a body of men, to secure an army or place from being surprized by an enemy.

In a garrison the guards are relieved every day, and it comes to every soldier's turn once in three days, so that they have two nights in bed, and one upon guard. To be upon guard, to mount the guard, to dismount the guard, to relieve the guard, to change the guard, the officer of the guard, or the serjeant of the guard, are words often used, and well understood.

**Advanced GUARD**, is a party of either horse or foot, that marches before a more considerable body, to give notice of any approaching danger.

When an army is upon the march, the grand-guards which should mount that day, serve as an advanced-guard to the army: in small parties, six or eight horse are sufficient, and these are not to go above four or five hundred yards before the party.

An advanced-guard is also a small body of twelve or sixteen horse, under a corporal, or quarter-master, posted before the grand-guard of a camp.

**Artillery-GUARD**, is a detachment from the army, to secure the artillery: their corps de garde is in the front, and their centries round the park. This is a forty-eight hours guard: and upon a march, they go in the front and rear of the artillery, and must be sure to leave nothing behind; if a gun or waggon break down, the captain is to leave a part of his guard to assist the gunners and matrosses in getting it up again.

**Corps de GARDE**, are soldiers entrusted with the guard of a post, under the command of one or more officers.

**Counter-GUARD**, in fortification. See the article **COUNTER-GUARD**.

**Forrage-GUARD**, a detachment sent out to secure the forragers, which are posted at all places, where either the enemy's party may come to disturb the forragers; or where they may be spread too near the enemy, so as to be in danger of being taken. They consist both of horse and foot, and must stay at their posts till the forragers all come off the ground.

**Grand-GUARD**, three or four squadrons of horse, commanded by a field-officer, posted at about a mile and a half from the camp, on the right and left wings, towards the enemy, for the security of the camp.

**Main-GUARD**, that from whence all the other guards are detached.

Those who are to mount the guard, meet at their respective captain's quarters, and go from thence to the parade; where, after the whole guard is drawn up, the final guards are detached for the posts and magazines; and then the subaltern officers throw lots for their guards, and are commanded by the captain of the main-guard.

**Picquet-GUARD**, a good number of horse and foot always in readiness in case of an alarm: the horse are all the time saddled, and the riders booted. The foot draw up at the head of the battalion, at the beating of the tattoo; but afterwards return to their tents, where they hold themselves in readiness to march, upon any sudden alarm. This guard is to make resistance, in case of an attack, till the army can get ready.

**Quarter-GUARD**, a small guard, commanded by a subaltern officer, posted by each battalion, about an hundred yards before the front of the regiment.

**Rear-GUARD**, that part of the army which brings up the rear, which is generally the old grand-guards of the camp. The rear-guard of a party is six or eight horse, that march about four or five hundred paces behind the party. The advanced-guard of a party on its going out, make the rear guard on its return.

**Standard-GUARD**, a small guard, under a corporal, out of each regiment of horse, and placed on foot, in the front of each regiment.

**Van-GUARD**, that part of the army which marches in the front.

**GUARD** is more particularly understood of a soldier detached from a company or corps, to protect, detain, or secure any person, &c.

**GUARDS** are also troops kept to guard the king's person, called also royal-guards, life-guards, gardes du corps, &c. These are distinguished into horse, foot, grenadiers, and yeomen.

The english horse-guards are distinguished by troops, and the foot-guards by regiments.

*Yeomen of the GUARDS.* See YEOMAN.

*The french GUARDS* are divided into those within, and those without the palace; the first consists of the gardes du corps, or body-guard, which consists of four companies of horse, the first of which companies was antiently Scotch, and still retains the name, though it now consists wholly of Frenchmen. The guards without, are the gens d'armes, light-horse, musketeers, and two other regiments, the one of which is French and the other Swiss. See GENDARMES.

**GUARD**, in fencing, is a posture proper to defend the body from an enemy's sword.

There are four general guards of the sword; to form a perfect idea of which, we must suppose a circle drawn on a wall, and divided into four cardinal points, viz. top and bottom, right and left. When the point of the sword is directed to the bottom of the circle, with the hilt opposite to its top, the body inclining very forward, this is called the prime or first guard. The second guard, by many improperly called the tierce, is when the point is directed to the right or second point of the same circle, with the hilt of the sword turned to the left, and the body proportionably raised. The tierce, or third guard, is when the point of the sword is raised to the uppermost part of the same circle; in which case the body, the arm, and the sword, are in their natural position, and in the mean of the extremes of their motion. The quart, or fourth guard, is when the point of the sword is directed to the fourth point of the circle, descending to the right as far as one fourth of the tierce, with the outward part of the arm and the flat of the sword turned towards the ground, and the body out of the line to the right, and the hilt of the sword towards the line to the left. There is also a quint, or fifth guard, which is only the return of the point of the sword to the right, after tra-

versing the circle to the point of the prime, from whence it had departed, with a different disposition of the body, arm, and sword. The common center of all those motions ought to be in the shoulder.

In all these kinds of guards, there are the high-advanced, high-retired, and high-intermediate guard, when disposed before the upper part of the body, either with the arm quite extended, quite withdrawn, or in a mean state. The mean-advanced guard, or simply mean guard, is when the sword is placed before the middle part of the body. The low-advanced, retired or intermediate guards, are those where the arm and sword are advanced, withdrawn, or between the two extremes, before the lower part of the body.

**GUARDANT**, or **GARDANT**, in heraldry. See the article **GARDANT**.

**GUARDIAN**, in law, a person who has the charge of any thing; but more commonly it signifies one who has the custody and education of such persons as have not sufficient discretion to take care of themselves and their own affairs, as children and idiots.

There are several sorts of these guardians at common law, viz. guardians by nature, who are the father and mother; guardians in socage, being the next of blood; and guardians by reason of nurture, which is when the father by will appoints a person to be the guardian of his child. The statute ordains, that a father, by deed in his life-time, or by his will, may dispose of the custody of his child, under twenty-one years of age and not married, during the child's minority, to any persons who are not popish recusants, as he shall think fit; which guardians may bring actions of trespass, &c. against any unlawful takers away of such child or children, and take possession of their lands, &c. If the father appoints no guardians to his child, the ordinary, or spiritual court have power to order one for the goods and personal estate only, until the infant is of the age of fourteen; but as to his lands, there shall be a guardian in socage, &c. This guardianship in socage continues till the minor is fourteen years of age, at which time he may choose his guardian before a judge, at his chambers, or in court, or chancery: likewise after the infant comes to that age, he may sue his guardian in socage, to account as bailiff.

The business of guardians is to take the profits of the minor's lands to his use, and



and to account for the same : they ought to sell all moveables within a reasonable time, and to convert them into land or money, except the minor is near of age, and may want such things himself ; and they are to pay interest for the money in their hands, that might have been so placed out ; in which case it will be presumed that the guardians made use of it themselves. They are to sustain the land of the heir, without making destruction of any thing thereon, and to keep it safely for him : if they commit waste on the lands, it is a forfeiture of the guardianship. 3 Edw. I. And where persons, as guardians, hold over any land, without the consent of the person who is next intitled, they shall be adjudged trespassers, and shall be accountable. 6 Annæ, cap. xviii.

**GUARDIANS D'EGLISE**, are churchwardens or officers chosen in every parish, to have the care and custody of the goods of the church.

**GUARDIANS of the peace**, are those who have the keeping of the peace.

**GUARDIAN, or WARDEN of the cinqueports**, is an officer who has the jurisdiction of the cinqueports, with all the power which the admiral of England has in other places.

**GUARDIAN of the spiritualities**, the person to whom the spiritual jurisdiction of any diocese is committed, during the time the see is vacant.

A guardian of the spiritualities may likewise be either such in law, as the archbishop is of any diocese within his province ; or by delegation, as he whom the archbishop, or vicar-general for the time, appoints. Any such guardian has power to hold courts, grant licences, dispensations, probates of wills, &c.

**GUAPERVA**, in ichthyology, a species of chætodon. See **CHÆTODON**.

**GUAZUMA**, in botany, the same with the cacao or theobroma. See the article **THEOBROMA**.

**GUBEN**, a town of Germany, in the circle of upper Saxony : east lon. 15°, and north lat. 51° 50'.

**GUDGEON, gobius**, in ichthyology. See the article **GOBIVUS**.

**GUDGEONS**, in a ship, are the eyes drove into the stern-post, into which the pintles of the rudder go, to hang it. See plate

[ CXXI. fig. 3.

The stems of the gudgeons are barred, to prevent their being drawn out.

**GUELPHS and GIBELINS**. See the article **GIBELINS**.

**GUENGA**, a great river of the hither India, which rising in the mountains of Balagate, runs north-east, and falls into the west branch of the river Ganges, in Bengal.

**GUERET**, a town of France, in the province of Lioinois : east lon. 2°, and north lat. 46° 5'.

**GUERITE**, a small tower of wood or stone, generally placed on the point of a bastion, or on the angles of the shoulder, to hold a centinel, who is to take care of the foss, and to watch, in order to prevent a surprize.

**GUERNSEY, or GARNSEY**, an island in the english channel, on the coast of Normandy, fifty-eight miles south of Portland, in Dorsetshire, and twenty-two west of cape la Hogue, in Normandy ; about ten miles long and as many broad, containing ten parishes. The natives, who speak french, are still governed by the norman laws, but are subject to England.

**GUIAQUIL**, a city and port-town of Peru, situated near the Pacific ocean : west lon. 80°, and south lat. 3°.

**GUIARA**, a port-town on the Caracooa-coast, in terra firma, in south America : west longitude 66°, and north latitude 10° 35'.

**GUIDON**, a sort of flag or standard, borne by the king's life-guards ; being broad at one extreme, and almost pointed at the other, and slit or divided into two.

**GUIDON** also denotes the officer who bears the guidon. He is the same in the horse-guards that the ensign is in the foot. The guidon of a troop of horse takes place next below a cornet.

**GUIDONIA**, in botany, the name given by Plumier to the famyda of Linnæus.

**GUIENNE**, a province of France, bounded by the Orleansois on the north, by Gascony, from which it is separated by the river Garonne, on the south, by Languedoc on the east, and by the bay of Biscay on the west.

**GUILANDINA, BONDUCH**, in botany, a genus of the *decandria-monogynia* class of plants, the flower of which consists of five lanceolate and sessile petals : the fruit is a rhomboidal pod, containing only one cell, in which are included numerous osseous seeds, of a globose-compressed figure. For the virtue of these seeds, see the article **BONDUCH**.

**GUILD**,

**GUILD**, or **GILD**, a fraternity or company. As to the original of these guilds or companies, it was a law among the Saxons that every freeman of fourteen years of age, should find sureties to keep the peace, or be committed; upon which the neighbours entered into an association, and became bound for each other, either to produce him who committed any offence, or to make satisfaction to the injured party; in order to which they raised a sum among themselves, which they put into a common stock; out of which they, upon occasion, made a pecuniary compensation according to the quality of the offence committed. These guilds are now companies, joined together with laws and orders made by themselves, by the licence of the prince.

**GUILD**, **GILD**, or **GELD**, is also used among our antient writers for a compensation, or mulct, for a fault committed.

**GUILD-HALL**, the chief hall of the city of London, for holding of courts, and for the meeting of the lord-mayor and commonalty, in order to make laws and ordinances for the welfare and regulation of the city.

**GUILD-RENTS**, are rents paid to the crown by any guild or fraternity: or those that formerly belonged to religious houses, and came to the crown at the general dissolution of monasteries.

**GUILDFORD**, or **GULDEFORD**, a borough-town of Surry, situated on the river Wye, thirty miles south-west of London.

It sends two members to parliament.

**GUILLESTRE**, a city of France, in the province of Dauphiny: east lon.  $6^{\circ} 20'$ , and north lat.  $44^{\circ} 45'$ .

**GUINEA**, a large country of Africa, situated between  $15^{\circ}$  east and  $15^{\circ}$  west longitude, and between  $4^{\circ}$  and  $10^{\circ}$  north latitude.

The British, Dutch, French, and other nations, have forts and factories on this coast.

**GUINEA** is also the name of a british gold-coin. See the article **COIN**.

**GUINEA-PIG**, in zoology, a quadruped of the mouse or rat-kind, with a variegated body, resembling, in some measure, a young pig, whence the name. It is considerably larger than the rat, but less than the rabbit. See plate CXXI. fig. 5.

**GUINEA-WORM**, *dracunculus*, in zoology and medicine. See **DRACUNCULI**.

**GUIPUSCOA**, the north-east division of the province of Biscay, in Spain, situ-

ated on the confines of Navarre in France.

**GUIRA**, or **GUARA GUAINUMBI**, in ornithology, the brasilian name of the green iipida, with a crested head and very long tail.

**GUISE**, a town of France, in the province of Picardy, situated on the river Oyse: east lon.  $3^{\circ} 36'$  and north lat.  $49^{\circ} 55'$ .

**GUITAR**, or **GUITARRA**, a musical instrument of the string-kind, with five double rows of strings, of which those that are bass, are in the middle, unless it be for the burden, an octave lower than the fourth.

This instrument was first used in Spain, and by the Italians. It has the particular denomination of *spagnuola* given it; and is found in Italy and other countries, but more frequently in Spain.

**GULA**, in anatomy, the same with the oesophagus. See **OESOPHAGUS**.

**GULA**, or **GOLA**, in architecture, a wavy member, the contour of which resembles the letter S, which the Greeks call *cymatium*, and our architects an *ogee*. See the article **CYMATIUM** and **OGE**. This member is of two kinds, *recta* and *inversa*. The first and principal has its cavities or hollows above, and convexities below. This always makes the top of the corona of the cornice, jetting over the drip of the cornice, like a wave ready to fall. It is sometimes absolutely the entablature, as being the first or uppermost member of it.

The second, being also called *gula inversa*, as the first is called *gula recta*, is exactly the reverse of the former, the cavity or hollowness of it being at the bottom, so that with respect to the former it appears inverted. This is used in the architrave, and sometimes in the cornice along with the former, only separated by a *reglet*.

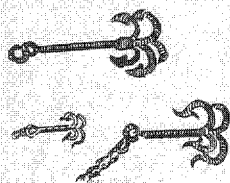
**GULES**, in heraldry, signifies the colour red, which is expressed in engraving by perpendicular lines falling from the top of the escutcheon to the bottom. See plate CXXI. fig. 6.

It is the first of all colours in armory, and was formerly prohibited to be worn by any person in his coat-armour, unless he were a prince, or had a permission from him. This colour is a symbol of charity, valour, generosity, and represents blood-colour, and true scarlet.

The Romans, according to Spelman, painted the bodies of their gods, and generals that triumphed, with vermilion;

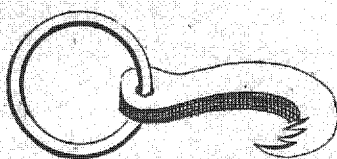
*Fig. 1.*

GRAPNELS.



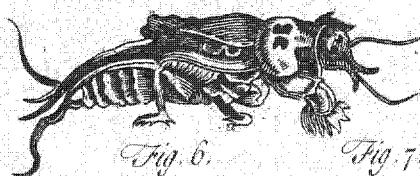
*Fig. 2.*

GRUBBING HOOK.



*Fig. 4.*

GRYLLOTALPA

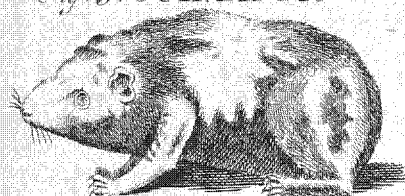


*Fig. 3.*

GUDGEON.

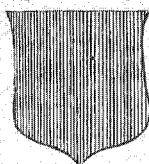


*Fig. 5. GUINEA-PIG*



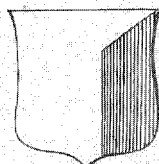
*Fig. 6.*

GULES.

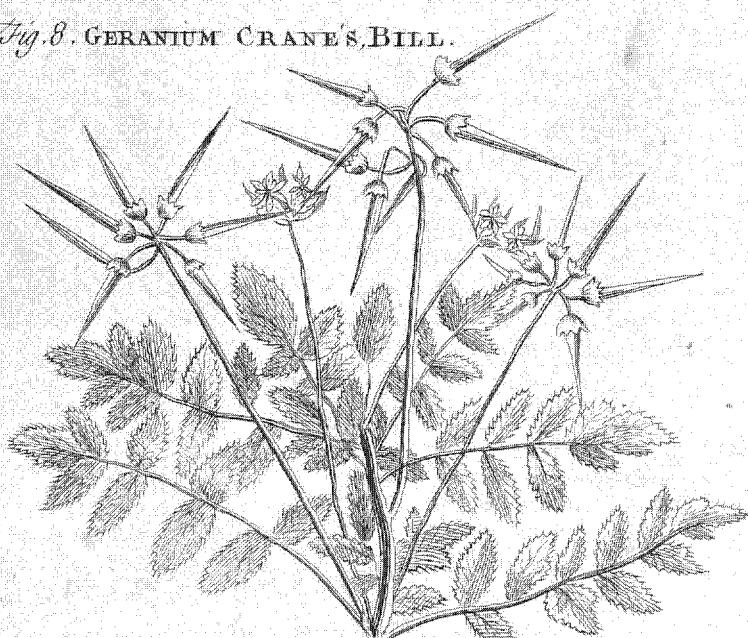


*Fig. 7.*

GUSSET.



*Fig. 8. GERANIUM CRANE'S BILL.*





and under the consuls, their soldiers were clad in red, hence called *ruffati*. And we are told that the Lacedemonians wore scarlet, to prevent seeing the blood issue from their wounds. Those who bear this colour, are obliged to relieve such as are in danger of being oppressed by injustice.

**GULICK**, the same with *Juliers*. See the article *JULIERS*.

**GULL**, the english name of a genus of birds, called by authors *larus*. See the article *LARUS*.

**GULLET**, in anatomy, the english name of the *oesophagus*. See *OESOPHAGUS*.

**GULPH**, or *GULF*, in geography, a part of the sea, almost surrounded by land, as the gulph of Mexico, gulph of Venice, of Lyons, &c.

A gulph is strictly distinguished from a sea, in that the latter is larger. See the article *SEA*.

It differs from a bay, in being greater than it. See the article *BAY*.

Some will have it essential to a gulph, to run into the land through a streight or narrow passage. It is observed that the sea is always most dangerous near gulphs, by reason of the currents being penned up by the shores.

**GUM**, in pharmacy, a concreted vegetable juice, which transudes through the bark of certain trees, and hardens upon the surface.

The chemists allow only those to be properly gums, which are dissolvable in water; those which are only dissolvable in spirits, they call resins; and those of a middle nature, gum-resins. Geoffroy says, that gums are something between acid and oil; being an acid salt so fixed in earth, as that the greatest part of it is changed to an alkali, the other into oil; so that the mixture arising from thence is an oily salt resembling the saponaceous concretes of the chemists, made of oil of olives, and a lixivium of tartar; or the mucilaginous bodies formed of spirit of wine, and the volatile spirit of urine. The bodies of this class, Dr. Hill observes, if we were to allow all to be so which are generally received as such, and called by the name gum, would appear very numerous: but, on a strict enquiry, the far greater part of them appear to be properly either of the gum-resin, or of the absolute resin-class, when all that are thus improperly called gums are separated and placed in their proper classes. See the article *RESIN*,

The bodies truly belonging to this, are, by that author, reduced to so small a number as four; these are, 1. Gum arabic. 2. Gum seneca. 3. Gum tragacanth. 4. Manna.

**GUM ARABIC**. See *Gum ARABIC*.

**GUM SENECA**, or *SENEGA*, as it is commonly written, is a gum extremely resembling gum arabic. It it brought to us from the country through which the river Senega runs, in loose or single drops, but these are much larger than those of the gum arabic usually are; sometimes it is of the bigness of an egg, and sometimes much larger: the surface is very rough, or wrinkled, and appears much less bright than the inner substance, where the masses are broken. It has no smell, and scarce any taste. We are not acquainted with the tree which produces it. The virtues of it are the same with the gum arabic; but it is rarely used in medicine, unless as mixed with the gum arabic: the dyers and other artificers consume the great quantities of it that are annually imported here. The negroes dissolve it in milk, and in that state make it a principal ingredient in many of their dishes; and often feed on it thus alone.

**GUM TRAGACANTH**. See the article *TRAGACANTH*.

**GUM MANNA**. See the article *MANNA*. Other substances known by the name of gums, are as follow.

**GUM ALOES**, a preparation of aloes, as set down in the London Dispensatory. See the article *ALOES*.

It is made thus: Take of succotrine aloes, four ounces; of water, a quart: boil the aloes till it is dissolved as much as may be; and set all by for a night: the resin will be precipitated to the bottom of the vessel; the liquor, poured off or strained, being evaporated, will leave the gum. The intention of this separation of the resin, is to procure, in the gum, a medicine less purgative, but more agreeable to the stomach, than the crude aloes.

**GUM AMMONIAC**. See the article *Gum AMMONIAC*.

**GUM ANIME**. See *Gum ANIME*.

**GUM ELEMI**. See the article *ELEMI*.

**GUM GUAIACUM**. See *GUAIACUM*.

**GUM LACCA**. See the article *LACCA*.

It may be observed in general, that gums and inspissated juices are the better, the freer they are from mixture and dross; but that they are seldom fit for use before straining,

**GUM**, among gardeners, a kind of gangrene incident to fruit-trees of the stone-kind, arising from a corruption of the sap, which, by its viscosity, not being able to make its way through the fibres of the tree, is, by the protrusion of other juice, made to extravasate and ouze out upon the bark.

When the distemper surrounds the branch, it admits of no remedy, but when only on one part of a bough, it should be taken off to the quick, and some cow-dung clapped on the wound, covered over with a linnen-cloth, and tied down. M. Quintinie directs to cut off the morbid branch two or three inches below the part affected.

**GUMS**, *gingiva*, in anatomy. See the article GINGIVÆ.

**GUN**, a fire-arm, or weapon of offence, which forcibly discharges a ball, shot, or other offensive matter, through a cylindrical barrel, by means of gun-powder. See the article GUN-POWDER.

Gun is a general name, under which are included divers or even most species of fire-arms. They may be divided into great and small.

Great guns, called also by the general name cannons, make what we also call ordnance, or artillery; under which come the several sorts of cannons, as cannon-royal, demi-cannon, &c. Culverins, demi-culverins, fakers, minions, falcons, &c. See CANNON, CULVERIN, &c. as also ORDNANCE and ARTILLERY.

Small guns include musquets, muskettoons, carabines, blunderbusses, fowling-pieces, &c. See MUSQUET, &c.

Pistols and mortars are almost the only sort of regular weapons, charged with gun-powder, that are excepted from the denomination of guns. See the articles PISTOL and MORTAR.

We have given the proportions and uses of these fire-arms, under their respective articles; but that their parts may be the more distinctly comprehended, there is delineated in the Plate of Gunnery (CXXII) fig. 1. a view of the outside of a piece of ordnance, with the names of its parts; fig. 2. *ibid.* shews the chase or bore, and the thickness of the metal; fig. 4. is a cannon mounted on its carriage; and fig. 3. is a mortar mounted on its carriage.

The advantage of large guns, or cannons, over those of a smaller bore, is generally acknowledged. Robins observes that this advantage arises from several circumstances, particularly in distant can-

nonading. The distance to which larger bullets fly with the same proportion of powder, exceeds the flight of the smaller ones, almost in proportion to their diameters; so that a thirty-two pound shot, for instance, being somewhat more than six inches in diameter, and a nine-pound shot but four inches, the thirty-two pound shot will fly near half as far again as that of nine pound, if both pieces are so elevated as to range to the farthest distance possible. Another and more important advantage of heavy bullets is, that with the same velocity they break holes in all solid bodies, in a greater proportion than their weight. Finally, large cannons, by carrying the weight of their bullet in grape or lead-shot, may annoy the enemy more effectually than could be done by ten times the number of small pieces. See the article GUNNERY.

The author here quoted, has proposed to change the fabric of all the pieces employed in the british navy, from the twenty-four pounders downwards, so that they may have the same or less weight, but a larger bore. He thinks the thirty-two pounders in present use would be proper models for this purpose. These being of fifty-two or fifty-three hundred weight, have somewhat less than a hundred and two thirds for each pound of bullet. And that this proportion would answer in smaller pieces, in point of strength, seems clear from these considerations: 1. That the strength of iron, or any other metal, is in proportion to its substance. 2. That the lesser quantity of powder fired in a space it fills, has proportionably less force than a larger quantity; so that if two pieces, a large and a small one, be made in the same proportion to their respective bullets, and fired with a proportionable quantity of powder, the larger piece will be more strained, will heat more, and recoil more than the smaller.

On this scheme our present twenty-four pounders will be eased of six or eight hundred weight of useless metal; and some pieces of a less calibre, as nine and six pounders, would be sometimes eased by fourteen hundred: hence much larger guns, of the same weight, might be borne. Thus, instead of six, nine, twelve, and eighteen pounders, our ships might carry twelve, eighteen, and twenty-four pounders: guns would be kept cooler and quieter, and would be of more service, in many respects, if their usual charge of powder were diminished.



GUNNERY.

Inside of a Piece of Ordnance

The Mouth or Caliber  
Cornish Ring

Fig. 1.

Outside of a Piece of Ordnance

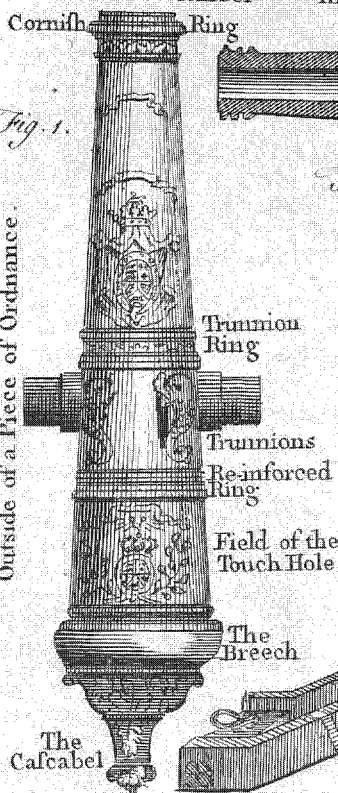


Fig. 2.

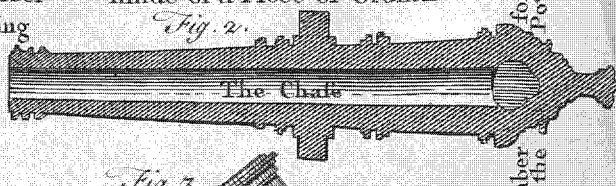


Fig. 3.

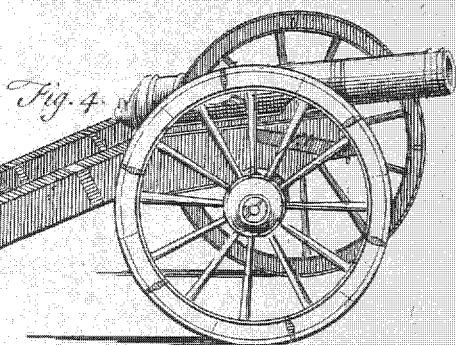
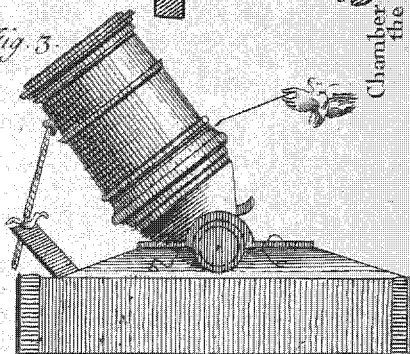


Fig. 4.

Fig. 5.

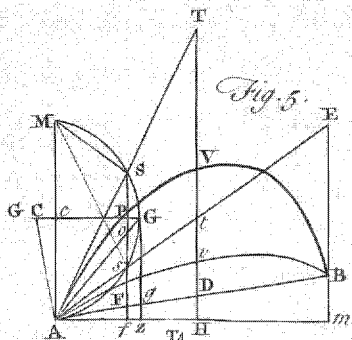


Fig. 6.

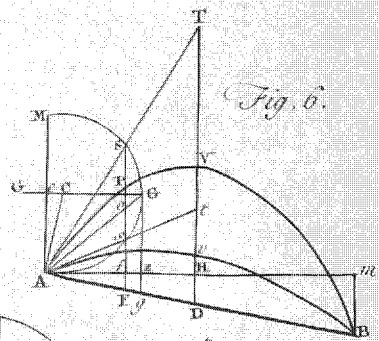


Fig. 7.

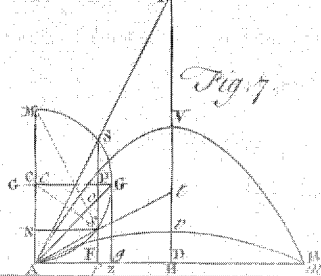
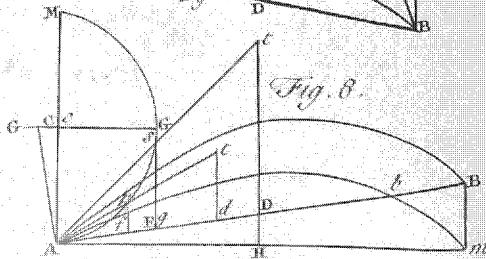


Fig. 8.





**GUN** is also a name given to an instrument used by miners in cleaving rocks with gun-powder. It is an iron cylinder of an inch and a half thick, and about six inches long; and having a flat side to receive the side of a wedge; and a hole drilled through it to communicate with the inside of the hole in the rock: this hole is made about eight inches deep, and in the bottom of it is put about two or three ounces of gun-powder: then this gun is driven forcibly in, so as to fill up the hole, and the wedge is driven in on its flat side to secure it.

The priming at the hole is then fired by a train, and the orifice being so well stopped by this gun, the force of the powder is determined to the circumadjacent parts of the rock, which it splits.

See the article **MINING**.

**GUN-ROOM**, in a ship, the apartment under the great cabin, where the master-gunner and his crew rendezvous, get ready their cartridges, &c. and do all things belonging to their business.

**GUNELLUS**, in ichthyology, a species of blennius, called also the butter-fish, with about ten black spots beside the back-fin.

**GUNNER**, an officer appointed for the service of the cannon; or one skilled to fire the guns.

In the Tower of London, and other garrisons, as well as in the field, this officer carries a field staff, and a large powder horn in a string over his left shoulder: he marches by the guns, and when there is any apprehension of danger, his field staff is armed with match: his business is to lay the gun to pass, and to help to load and traverse her.

**GUNNER** of a ship, or master gunner, has the charge of all the ordnance the ship carries, to see that they be serviceably mounted, and sufficiently supplied with sponges, ladles, and rammers; that in foul weather they be traversed within board, especially those of the lower tire, and that the parts be shut, and caulked up; and that at all times they may be well lashed, and made fast, lest any of them break loose, to the imminent danger of foundering the ship. In the time of an engagement, the gunner is to see that every piece be sufficiently manned: he is answerable to give an account of all his charge upon demand. He has a mate and quarter-gunners for his assistance.

**Master-GUNNER**, a patent-officer of the ordnance, who is appointed to teach all

such as learn the art of gunnery, and to certify to the master-general the ability of any person recommended to be one of the king's gunners. To every scholar he administers an oath, not to serve, without leave, any other prince or state; or teach any one the art of gunnery, but such as have taken the said oath.

**GUNNER'S LEVEL**. See the article **LEVEL**.

**GUNNER'S TACKLE**. See **TACKLE**.

**GUNNERY**, is the art of determining the the course and directing the motion of bodies shot from artillery, or other war-like engines.

The great importance of this art is the reason it is distinguished from the doctrine of projectiles in general: for it is no more than an application of those laws which all bodies observe when cast into the air, to such as are put in motion by the explosion of guns or other engines of that sort. And it is the same thing whether it is treated in the manner of projectiles in general, or of such only as belong to gunnery; for from the moment the force is impressed, all distinction with regard to the power which put the body first in motion is lost, and it can only be considered as a simple projectile. See the article **PROJECTILES**.

**Prob. I.** The impetus of a ball, and the horizontal distance of an object aimed at, with its perpendicular height or depression, if thrown on ascents or descents, being given, to determine the direction of that ball.

From the point of projection A (plate CXXII. fig. 5, 6, 7, 8) draw Am representing the horizontal distance, and Bm the perpendicular height of the object aimed at: Bisect Am in H, and AH in f; on H and f erect HT, fF perpendicular to the horizon, and bisecting AB the oblique distance or inclined plane in D, and AD in F. On A raise the impetus AM at right angles with the horizon, and bisect it perpendicularly in c, with the line GG. Let the line AC be normal to the plane of projection AB, and cutting GG in C; from C as center, with the radius CA, describe the circle AGM cutting if possible the line FS in S, s, points equally distant from G; lines drawn from A through S, s will be the tangents or directions required.

Continue A S, A s to T, t; bisect DT, Dt, in V, v; and draw lines from M to S, s; then the  $\angle ASF = \angle MAS = \angle AMs = \angle sAF$ ; and for the same reason  $\angle A s F = \angle MAs = \angle AMS =$

$\angle SAF$ ; wherefore the triangles  $MAS$ ,  $SAF$ ,  $FAF$  are similar, and  $AM : AS :: AS : sF = tv$ ; consequently  $AT$  is a tangent of the curve passing through the points  $A$ ,  $v$ , and  $B$ ; because  $tv = vD$ ,  $AD$  is an ordinate to the diameter  $TH$ , and where produced must meet the curve in  $B$ .

In horizontal cases (fig. 7.)  $v$  is the highest point of the curve, because the diameter  $TVH$  is perpendicular to the horizon.

When the mark can be hit with two directions (the triangles  $SAM$ ,  $sAF$  being similar) the angle which the lowest direction makes with the plane of projection is equal to that which the highest makes with the perpendicular  $AM$ , or  $\angle sAF = \angle SAM$ . And the angle  $SA s$ , comprehended between the lines of direction, is equal to the angle  $SCG$ , and is measured by the arch  $SG$ .

When the points  $S$ ,  $s$  coincide with  $G$ , or when the directions  $AS$ ,  $As$  become  $AG$ ; (fig. 8.)  $AB$  will be the greatest distance that can be reached with the same impetus on that plane; because  $SF$  coinciding with  $Gg$  the tangent of the circle at  $G$ , will cut off  $Ag$  a fourth part of the greatest amplitude on the plane  $AB$ . The rectangular triangles  $mAB$ ,  $cAC$  are similar, because the angle of obliquity  $mAB = cAC$ ; wherefore  $mA : mB :: \frac{1}{2} \text{ impetus} : cC$ , and  $mA : AB :: AC : AC$ .

*Horizontal projections (ibid. fig. 7, 8.)*

When the impetus is greater than half the amplitude, there are two directions,  $TAH$ , and  $tAH$  for that amplitude; when equal to it, only one; and when less, none at all; and conversely. For in the first case the line  $FS$  cuts the circle in two points  $S$ ,  $s$ , in the second case it only touches it, and in the last it meets not with it at all; and conversely. When there is but one direction for the amplitude  $Am$ , the angle of elevation is  $45^\circ$ ; and when the angle of elevation is of  $45^\circ$   $Am$  is the greatest amplitude for that impetus, and equal to twice the impetus. The impetus remaining the same, the amplitudes are in proportion to one another as the sines of double the angles of elevation, and conversely. For drawing  $sN$  (fig. 7.) parallel and equal to  $AF$  a fourth part of the amplitude, and supposing lines drawn from  $s$  to the points  $C$  and  $M$ , the angle  $ACs = 2 \angle AMs = 2 \angle sAF$ ; therefore  $Ns$ , the sine of  $ACs$ ,

is the sine of twice the angle  $sAF$ ; half the impetus being radius.

Whence, at the directions of  $45^\circ$  or  $75^\circ$ , the amplitude is equal to the impetus: for from what has been said, half the impetus being radius, a fourth part of the amplitude is the sine of twice the angle of elevation; but the sine of twice  $45^\circ$ , that is, the sine of  $90^\circ$  is always equal to half the radius; or in this case a fourth part of the impetus is equal to a fourth part of the amplitude. From this and the preceding prop. there are two easy practical methods for finding the impetus of any piece of ordnance. The fourth part of the amplitude is a mean proportional between the impetus at the curve's principal vertex and its altitude. For  $MN : Ns :: Ns : NA = sF = vD$ .

The altitudes are as the versed sines of double the angles of elevation, the impetus remaining the same. For making half the impetus radius,  $AN$  the altitude is the versed sine of the angle  $ACs =$  twice  $\angle sAF$ . And also, radius : tangent  $\angle$  elevation ::  $\frac{1}{2}$  amplitude : altitude. that is,  $R : \text{tangent } \angle sAf :: Af : fs = Dv$ .

*Proj. on ascents and descents, fig. 5, 6.*

If the mark can be hit only with one direction  $AG$ , the impetus in ascents will be equal to the sum of half the inclined plane and half the perpendicular height, and in descents it will be equal to their difference; but if the mark can be reached with two directions, the impetus will be greater than that sum or difference. For when  $AG$  is the line of direction, the  $\angle gGA$  being  $= MAG = GAg$ ;  $Gg = Ag$ , and  $gz$  added to or subtracted from both makes  $Gz$  half the impetus equal to the sum or difference of  $Ag$  a fourth part of the inclined plane, and  $gz$  a fourth part of the perpendicular height. In any other direction  $FP$  is greater than  $Fo = AF$ ; and  $Ff$  added to or subtracted from both, makes  $fP$  half the impetus greater than the sum or difference of  $AF$  a fourth part of the inclined plane, and  $Ff$  a fourth part of the perpendicular height. Whence if in ascents the impetus be equal to the sum of half the inclined plane and half the perpendicular height, or if in descents it be equal to their difference, the mark can be reached only with one direction; if the impetus is greater than that sum or difference, it may be hit with two directions;

rections ; and if the impetus is less, the mark can be hit with none at all.

Prob. II. The angles of elevation, the horizontal distance, and perpendicular height being given, to find the impetus.

Fig. 5, 6.

From these data you have the angle of obliquity, and length of the inclined plane ; then as

$As : AM :: S. LAMs : S. LAsM$   
 $:: S. LsAF : S. LMAF$ , and  
 $AF : As :: S. LMA s : S. LMAF$  ;  
 whence by the ratio of equality,  $AF : AM :: S. LsAF \times S. LMA s : S. LMAF \times S. LMAF$ , which gives this rule.

Add the log. of  $AF$  to twice the logarithmic sine of the angle  $MAF$  ; from their sum subtract the logarithmic sines of the angles  $sAF$  and  $MA s$  ; and the remainder will give the logarithm of  $AM$  the impetus.

When the impetus and angles of elevation are given, and the length of the inclined plane is required, this is the rule. Add the log. of  $AM$  to the log. sines of the angles  $sAF$  and  $MA s$  ; from their sum subtract twice the log. sine of  $MAF$ , and the remainder will give the log. of  $AF$  the fourth part of the length of the inclined plane.

If the angle of elevation  $tAH$  and its amplitude  $AB$  (fig. 8.) and any other angle of elevation  $tAH$  is given ; to find the amplitude  $Ab$  for that other angle, the impetus  $AM$  and angle of obliquity  $DAH$  remaining the same.

Describe the circle  $AGM$  take  $AF$  a fourth part of  $AB$ , and  $As$  a fourth part of  $Ab$  : From the points  $F, s$ , draw the lines  $Fs$  and  $fs$  parallel to  $AM$ , and cutting the circle in the points  $s, p$  ; then  
 $AF : AM :: S. LsAF \times S. LMA s : S. LMAF \times S. LMAF$  ; and  $AM : As :: S. LMAF \times S. LMAF : S. LpAs \times S. LpAM$  ; whence by the ratio of equality,

$AF : As :: S. LsAF \times S. LMA s : S. LpAs \times S. LpAM$ , which gives this Rule.

Add the log. of  $AF$  to the log. sines of the angles  $pAs, pAM$  ; from their sum subtract the log. sines of the angles  $sAF, sAM$ , and the remainder will give the log. of  $As$ , a fourth part of the amplitude required.

Prob. III. To find the force or velocity of a ball or projectile at any point of the

curve, having the perpendicular height of that point, and the impetus at the point of projection given. From these two data find out the impetus at that point ; then  $2 \times 16$  feet 1 inch is the velocity acquired by the descent of a body in a second of time ; the square of which ( $4 \times \square 16$  feet 1 inch) is to the square of the velocity required, as 16 feet 1 inch is to the impetus at the point given ; wherefore multiplying that impetus by four times the square of 16 feet 1 inch, and dividing the product by 16 feet 1 inch, the quotient will be the square of the required velocity ; whence this rule. Multiply the impetus by four times 16 feet 1 inch, or 64 feet  $\frac{1}{2}$ , and the square root of the product is the velocity.

Thus suppose the impetus at the point of projection to be 3000, and the perpendicular height of the other point 100 ; the impetus at that point will be 3500. Then 2900 feet multiplied by 64  $\frac{1}{2}$  feet gives 186566 feet, the square of 432 nearly, the space which a body would run through in one second, if it moved uniformly.

And to determine the impetus or height, from which a body must descend, so as at the end of the descent it may acquire a given velocity, this is the rule :

Divide the square of the given velocity (expressed in feet run through in a second) by 64  $\frac{1}{2}$  feet, and the quotient will be the impetus.

11. The duration of a projection made perpendicularly upwards, is to that of a projection in any other direction whose impetus is the same, as the sine complement of the inclination of the plane of projection (which in horizontal projections is radius) is to the sine of the angle contained between the line of direction and that plane.

Draw out  $A t$  (fig. 5.) till it meets  $mB$  continued in  $E$ , the body will reach the mark  $B$  in the same time it would have moved uniformly through the line  $AE$  ; but the time of its fall through  $MA$  the impetus, is to the time of its uniform motion thro'  $AE$ , as twice the impetus is to  $AE$ . And therefore the duration of the perpendicular projection, being double the time of its fall, will be to the time of its uniform motion through  $AE$ , as four times the impetus is to  $AE$  ; or as  $AE$  is to  $EB$  ; that is, as  $A t$  is to  $tD$  ; which is as the sine of the angle  $tDA$  (or  $MAB$  its complement to a semicircle) is to the sine of the angle  $tAD$ .

Hence the time a projection will take to arrive at any point in the curve, may be found from the following data, *viz.* the impetus, the angle of direction, and the inclination of the plane of projection, which in this case is the angle the horizon makes with a line drawn from the point of projection to that point.

Hence also in horizontal cases, the durations of projections in different directions with the same impetus, are as the sines of the angles of elevation. But in ascents or descents their durations are as the sines of the angles which the lines of direction make with the inclined plane. Thus, suppose the impetus of any projection were 4500 feet; then 16 feet  $\frac{1}{2}$  inch : 1" :: 4500 feet : 275" the square of the time a body will take to fall per-

pendicularly thro' 4500 feet, the square root of, which is 16" nearly, and that doubled gives 32" the duration of the projection made perpendicularly upwards. Then to find the duration of a horizontal projection at any elevation, as  $20^{\circ}$ ; say  $R : S. L. 20^{\circ} :: 32'' : \text{Duration}$  of a projection at that elevation with the impetus 4500. Or if with the same impetus a body at the direction of  $35^{\circ}$  was projected on a plane inclined to the horizon  $17^{\circ}$ , say as sine  $73^{\circ} : \text{sine } 18^{\circ} :: 32'' : \text{duration required}$ .

The two following tables, at one view, give all the necessary cases as well for shooting at objects on the plane of the horizon, with proportions for their solutions, as for shooting on ascents and descents.

T A B L E I. For Horizontal Projections. Fig. 7.

	Given.	Required.	Proportions.
1	AM, $A_m$	$tAH$ $Hv$	$2AM : A_m :: R : S. 2L tAH$ $R : T. L tAH :: \frac{A_m}{4} : Hv$
2	AM, $tAH$	$A_m$	$R : S. 2L tAH :: 2AM : A_m$
3	$A_m$ , $tAH$	AM	$S. 2L tAH : R :: \frac{A_m}{2} : AM$
4	AM, $Hv$	$A_m$	$\sqrt{AN \times NM} = \frac{A_m}{4}$ , or $\frac{1}{2} \text{ Log.}$ $AN + \frac{1}{2} \text{ Log. NM} = \text{Log. } \frac{1}{4} A_m$
5	$A_m$ , $Hv$	$tAH$ AM	$\frac{A_m}{4} : Hv :: R : T. L tAH$ $AN : \frac{A_m}{4} :: \frac{A_m}{4} : NM$ , and $AN + NM = AM$
6	$Hv$ , $tAH$	$A_m$	$T. L tAH : R :: Hv : \frac{A_m}{4}$
7	$tAH$ , $A_m$ and any other angle. any other amplitude.	any other amplitude belonging to that angle. any other angle belonging to that amplitude.	$S. 2L tAH : S. 2 \text{ any other } L :: A_m : \text{amplitude required}$ $A_m : \text{any other amplitude} :: S. 2L tAH : S. 2L \text{ required}$
8	$tAH$ , $Hv$ , any other angle. any other altitude.	any other altitude. any other angle.	$V. S. 2L tAH : V. S. 2 \text{ any other } L :: Hv : \text{altitude required}$ $Hv : \text{any other altitude} :: V. S. 2L tAH : V. S. 2L \text{ required}$

TABLE II. For Projections on Ascents and Descents. Fig. 5, 6.

Cases.	Given.	Required.	Proportions.
1	AM, Am, Bm, AB.	TAH, tAH.	$Am : Bm :: R : T$ . $\angle BAm$ , half of which added to $45^\circ$ , gives $\angle GAz$ . $AM : AB :: Ac : AC = CG$ . $T.LGAz : R :: Gz : Az$ , and $Az - Af = fz = PG$ . $CG : PG :: R : V$ . S. of SG, half of which added to, or taken from $GAz$ , gives the higher or lower direction required.
2	TAH, tAH, AF	AM	$\text{Log. of } AM = \text{Log. of } AF + 2 \text{ Log. S. } \angle MAF - \text{Log. S. } \angle AF - \text{Log. S. } \angle MAz$ .
3	TAH, tAH, AM	AF	$\text{Log. of } AF = \text{Log. } AM + \text{Log. S. } \angle AF + \text{Log. S. } \angle MAz - 2 \text{ Log. S. } \angle MAF$ .
4	BAm, tAH, AB, and any other angle tAH	Ab the amplitude for that other angle.	Fig. 8. $\text{Log. } Af = \text{Log. } AF + \text{Log. S. } \angle Af + \text{Log. S. } \angle tAH - \text{Log. S. } \angle AF - \text{Log. S. } \angle MAz$ .
5	AM, DAH	Ag	Fig. 5, 6. $T.LGAz : \text{Sec. } \angle GAz :: Gz : Ag$ .

**GUN-POWDER**, a composition of saltpetre, sulphur, and charcoal, mixed together, and usually granulated; which easily takes fire, and, when fired, rarifies, or expands, with great vehemence, by means of its elastic force.

It is to this powder we owe all the action and effect of guns, ordnance, &c. so that the modern military art, fortification, &c. in great measure depend thereon.

*Method of making GUN-POWDER.* Dr. Shaw's recipe for this purpose is as follows. Take four ounces of refined saltpetre, an ounce of brimstone, and six drams of small coal: reduce these to a fine powder, and continue beating them for some time in a stone mortar, with a wooden pebble, wetting the mixture between whiles with water, so as to form the whole into an uniform paste, which is reduced to grains, by passing it thro' a wire-sieve fit for the purpose; and in this form being carefully dried, it becomes the common gun-powder.

For greater quantities, mills are usually provided, by means of which more work may be performed in one day, than a man can do in a hundred. See *MILL*.

The nitre or saltpetre is refined thus: dissolve four pounds of rough nitre as it

comes to us from the Indies, by boiling it in as much water as will commodiously suffice for that purpose: then let it shoot for two or three days in a covered vessel of earth, with sticks laid across for the crystals to adhere to. These crystals being taken out, are drained and dried in the open air.

In order to reduce this salt to powder, they dissolve a large quantity of it in as small a proportion of water as possible; then keep it constantly stirring over the fire, till the water exhales, and a white, dry powder is left behind. See *NITRE*. In order to purify the brimstone employed, they dissolve it with a very gentle heat; then scum and pass it through a double strainer. If the brimstone should happen to take fire in the melting, they have an iron cover that fits on close to the melting vessel, and damps the flame. The brimstone is judged to be sufficiently refined if it melts without yielding any fetid odour between two hot iron plates into a kind of red substance.

The coal for the making of gun-powder is either that of willow, or hazel, well charred in the usual manner, and reduced to powder. And thus the ingredients are prepared for making this commodity:

modity: but as these ingredients require to be intimately mixed and as there would be danger of their firing if beat in a dry form, the method is to keep them continually moist, either with water, urine, or a solution of sal ammoniac: they continue thus stamping them together for twenty-four hours, after which the mass is fit for coming and drying in the sun, or otherwise, so as sedulously to prevent its firing.

*Rationale of GUN-POWDER.* The explosive force of gun-powder is now a thing commonly known, but the physical reason thereof may not perhaps be hitherto sufficiently understood. In order to explain it, Dr. Shaw proposes the following observations, 1. That salt-petre of itself is not inflammable, and though it melts in the fire, and grows red hot, yet does not explode, unless it comes in contact with the coals. 2. That brimstone easily melts at the fire, and easily catches flame. 3. That powdered charcoal readily takes fire, even from the sparks yielded by a flint and steel. 4. That if nitre be mixed with powdered charcoal, and brought in contact with the fire, it burns and flames. 5. That if sulphur be mixed with powdered charcoal, and applied to the fire, part of the sulphur burns slowly away, but not much of the charcoal; and, 6. That if a lighted coal be applied to a mixture of nitre and sulphur, the sulphur presently takes fire with some degree of explosion; leaving part of the nitre behind, as we see in making the sal prunellæ, and sal polychrestum.

These experiments duly considered, adds the doctor, may give us the chemical cause of the strange explosive force of gun-powder. For each grain of this powder consisting of a certain proportion of sulphur, nitre, and coal, the coal presently takes fire, upon contact of the smallest spark: at which time both the sulphur and the nitre immediately melt, and by means of the coal interposed between them, burst into flame; which, spreading from grain to grain, propagates the same effect almost instantaneously: whence the whole mass of powder comes to be fired; and as nitre contains both a large proportion of air and water, which are now violently rarified by the heat, a kind of fiery explosive blast is thus produced, wherein the nitre stems, by its aqueous and aerial parts, to act as bellows to the other inflammable

bodies, sulphur and coal, to blow them into a flame, and carry off their whole substance in smoke and vapour.

*Different kinds of GUN-POWDER.* The three ingredients of gunpowder are mixed in various proportions according as the powder is intended for musquets, great guns, or mortars; though these proportions seem not to be perfectly adjusted, or settled by competent experience.

Semenowitz for mortars, directs 100 lb of salt-petre, 25 lb of sulphur, and as many of charcoal; for great guns, 100 lb of salt-petre, 15 lb of sulphur, and 18 lb of charcoal; for musquets and pistols 100 lb of salt-petre, 8 lb of sulphur, and 10 lb of charcoal. Miethius extols the proportion of 1 lb of salt-petre to three ounces of charcoal, and two, or two and a quarter of sulphur; than which, he affirms, no gun-powder can possibly be stronger. He adds, that the usual practice of making the gunpowder weaker for mortars than guns, is without any foundation, and renders the expence needlessly much greater: for whereas to load a large mortar, 24 lb of common powder is required, and consequently to load it ten times 240 lb he shews by calculation, that the same effect would be had by 150 lb of the strong powder.

To increase the strength of powder, Dr. Shaw thinks it proper to make the grains considerably large, and to have it well sifted from the small dust. We see that gun-powder, reduced to dust, has little explosive force; but when the grains are large, the flame of one grain has a ready passage to another, so that the whole parcel may thus take fire nearly at the same time, otherwise much force may be lost, or many of the grains go away as shot unfired.

It should also seem that there are other ways of increasing the strength of powder, particularly by the mixture of salt of tartar; but perhaps, adds the last-mentioned author, it were improper to divulge any thing of this kind, as gun-powder seems already sufficiently destructive.

*Method of trying and examining GUN-POWDER.* There are two general methods of examining gun-powder; one with regard to its purity, the other with regard to its strength. Its purity is known by laying two or three little heaps near each other upon white paper, and firing one of them: for if this takes fire readily

readily, and the smoke rises upright, without leaving any dross, or feculent matter behind, and without burning the paper, or firing the other heaps, it is esteemed a sign that the sulphur and nitre were well purified, that the coal was good, and that the three ingredients were thoroughly incorporated together: but if the other heaps also take fire at the same time, 'tis presumed that either common salt was mixed with the nitre, or that the coal was not well ground, or the whole mass not well beat, and mixed together; and if either the nitre or sulphur be not well purified, the paper will be black or spotted.

In order to try the strength of gun-powder, there are two kinds of instruments in use; but neither of them appear more exact than the common method of trying to what distance a certain weight of powder will throw a ball from a musquet.

There has been much talk of a white powder which, if it answered the character given it, might be a dangerous composition: for they pretend that this white powder will throw a ball as far as the black, yet without making a report; but none of the white powder we have seen, says Dr. Shaw, answers to this character; being, as we apprehend, commonly made either with touchwood or camphor, instead of coal.

*Observations on the force of GUN-POWDER.*

Gun-powder fired either in vacuum, or in air, produces by its explosion a permanent elastic fluid. For if a red-hot iron be included in a receiver, after being exhausted, and gun-powder be let fall on the iron, the powder will take fire, and the mercurial gage will suddenly descend upon the explosion; and though it immediately ascends again, yet it will never rise to the height it first stood at, but will continue depressed by a space proportioned to the quantity of gun-powder which was let fall on the iron.

The same production likewise takes place, when gun-powder is fired in the air: for if a small quantity of powder be placed in the upper part of a glass tube, and the lower part of the tube be immersed in water, and the water be made to rise so near the top, that only a small portion of air is left in that part where the gun-powder is placed; if in this situation the communication of the upper part of the tube with the external air be closed, and the powder be fired, which will easily be

done by a burning-glass, the water will in this experiment descend upon the explosion as the quicksilver did in the last; and will always continue depressed below the place at which it stood before the explosion; and the quantity of this depression will be greater, if the quantity of powder be increased, or the diameter of the tube be diminished. From whence it is proved, that as well in air as in a vacuum, the explosion of fired powder produces a permanent elastic fluid. It also appears from experiment, that the elasticity or pressure of the fluid produced by the firing of gun-powder, is, *cæteris paribus*, directly as its density. This follows from hence, that if in the same receiver a double quantity of powder be let fall, the mercury will subside twice as much as in the firing of a single quantity. To determine the elasticity and quantity of this elastic fluid, produced from the explosion of a given quantity of gun-powder, Mr. Robins premises, that the elasticity of this fluid increases by heat, and diminishes by cold in the same manner as that of the air; and that the density of this fluid, and consequently its weight, is the same with the weight of an equal bulk of air having the same elasticity, and the same temperature. From these principles, and from his experiments, for a detail of which we must refer the reader to his *New Principles of Gunnery*, in Scholium, to prop. II. he concludes, that the fluid produced by the firing of gun-powder will be  $\frac{3}{5}$  of the weight of the gun-powder, and the ratio of the respective bulks of the powder, and the fluid produced from it, will be in round numbers 1 to 244. Hence we are certain, that any quantity of powder fired in any confined space, which it adequately fills, exerts, at the instant of its explosion, against the sides of the vessel containing it, and the bodies it impels before it, a force at least 244 times greater than the elasticity of common air; or which is the same thing, than the pressure of the atmosphere; and this without considering the great addition which this force will receive from the violent degree of heat with which it is endued at that time, the quantity of which augmentation is the next head of Mr. Robins's enquiry. He determines that the elasticity of the air is augmented when heated to the extreme heat of red hot iron, in the proportion of 796 to 194  $\frac{1}{2}$ , and supposing that the flame of

fired

fired gun-powder is not less hot than red hot iron, and the elasticity of the air, and consequently of the fluid, generated by the explosion, being augmented by the extremity of this heat in the ratio of 796 to 194  $\frac{1}{2}$ , it follows that if 244 be augmented in this ratio, the resulting number which is 999  $\frac{1}{3}$  will determine how many times the elasticity of the flame of fired powder exceeds the elasticity of common air, supposing it to be confined in the same space, which the powder filled before it was fired.

Hence then the absolute quantity of the pressure exerted by gun-powder, at the moment of its explosion may be assigned: for since the fluid then generated has an elasticity of 999  $\frac{1}{3}$ , or in round numbers 1000 times greater than common air; and since common air by its elasticity exerts a pressure on any given surface equal to the weight of the incumbent atmosphere, with which it is in equilibrio, the pressure exerted by fired powder, before it has dilated itself, is 1000 times greater than the pressure of the atmosphere; and consequently the quantity of this force on a surface of an inch square, amounts to above six tun weight, which force however diminishes as the fluid dilates itself. The variations of the density of the atmosphere does not any way alter the action of powder by any experiment that can be made. But the moisture of the air has a very great influence on the force of it: for that quantity which in a dry season would communicate to a bullet a velocity of 1700 feet in one second, will not in damp weather communicate a velocity of more than 12 or 1300 feet in a second, or even less, if the powder be bad and negligently kept.

The velocity of expansion of the flame of gun-powder when fired in a piece of artillery, without either bullet, or any other body before it, is prodigious. By the experiments of Mr. Robins, it seems this velocity cannot be much less than 7000 feet in a second. This, however, must be understood of the most active part of the flame. For as was observed before, the elastic fluid in which the activity of gun-powder consists, is only  $\frac{1}{10}$  of the substance of the powder, the remaining  $\frac{9}{10}$  will in the explosion be mixed with the elastic part, and will by its weight retard the activity of the explosion; and yet they will be so com-

pletely united as to move with uncommon motion; but the unelastic part will be less accelerated than the rest, and some of it will not even be carried out of the barrel, as appears by the considerable quantity of unctuous matter, which adheres to the inside of all fire-arms, after they have been used. These inequalities in the expansive motion of the flame render it impracticable to determine its velocity, otherwise than from experiments.

*To recover damaged GUN-POWDER.* The method of the powder-merchants is this; they put part of the powder on a sail-cloth, to which they add an equal weight of what is really good, and with a shovel mingle it well together; dry it in the sun, and barrel it up, keeping it in a dry and proper place. Others again, if it be very bad, restore it by moistening it with vinegar, water, urine, or brandy: then they beat it fine, searce it, and to every pound of powder add an ounce, an ounce and a half, or two ounces, according as it is decayed, of melted saltpetre. Afterwards, these ingredients are to be moistened and mixed well, so that nothing can be discerned in the composition, which may be known by cutting the mass; and then they granulate it as aforesaid. In case the powder be in a manner quite spoiled, the only way is to extract the salt-petre with water, according to the usual manner, by boiling, filtrating, evaporating, and crystallizing; and then with fresh sulphur and charcoal to make it up a-new again. In regard to the medical virtues of gun-powder, Boerhaave informs us, that the flame of it affords a very healthy fume in the height of the plague: because the explosive acid vapour of nitre and sulphur corrects the air; and that the same vapour, if received in a small close pent up place, kills insects.

It is enacted by 5 and 11 of Geo. I. and 5 Geo. II. c. 20, that gun-powder be carried to any place in covered carriages; the barrels being close jointed; or in cases, and bags of leather, &c. And persons keeping more than 200 pounds weight of gun-powder, at one time, within the cities of London and Westminster, or the suburbs, &c. are liable to forfeitures if it be not removed; and justices of peace may issue warrants to search for, seize, and remove the same.

The invention of gun-powder is ascribed by Polydore Virgil to a chemist, who having accidentally put some of the ingredients



redients in this composition in a mortar, and covered it over with a stone, it happened to take fire, and blew up the stone. Thetvet says, the person here spoken of was a monk of Edinburgh, named Constantine Anelzen; but Belleforest and others hold it to be Bartholdus Schwartz, or the black; at least it is affirmed, that he first taught the use of it to the Venetians, in the year 1380, during the war with the Genoese. But what contradicts this account, and shews gun-powder to be of an older date, is, that Pet. Mexia, in his *Variae Lectiones*, relates, that Alphonsus XI. king of Castile used mortars against the Moors in a siege in 1343. Ducange adds, that there is mention made of this powder in the registers of the chambers of accounts in France, as early as the year 1338, and Frier Bacon, our country-man, mentions the composition in express terms, in his treatise *De nullitate magia*, published at Oxford, in the year 1216.

**GUN-SHOT-WOUNDS**, are attended with much worse consequences than wounds made by sharp instruments; for the parts are more shattered and torn, especially when the shot falls upon the joints, bones, or any considerable part.

In treating these wounds, the following rules must be observed; to extract all foreign bodies, to stop the hæmorrhage, to promote suppuration, to encourage new flesh, and to make an even cicatrix. The extraction of foreign bodies should, if possible, be performed with the hand; or if that cannot be done, with the forceps or a hook. They are easiest removed at first; for, after some delay, the tumour and inflammation of the parts, render it difficult and painful. Sometimes the orifice of the wound is so narrow, that it will be impossible to come at the body you have a desire to extract, without making a larger opening; which should be done on the most convenient side, always observing that no nerve, blood-vessel, tendon, or ligament lies in the way. And as two balls are frequently concealed in the same wound, after the removal of one, the surgeon should diligently search for another, or for any other extraneous body that may be forced in with it, which might protract the cure of the wound. When an attempt is made to extract the ball, or any other extraneous body, the patient should be laid in the same situation he was in at the time of receiving the wound; for, by

frequent changes of situation, the ball will easily bury itself and get out of your reach. Whenever a ball has penetrated so deep, that you can easily feel it with your finger on the side opposite to the wound, you should examine nicely whether it is safest to bring it back by the way it came in, or to make an opening upon it, and draw it out at the opposite side. If the wound cannot safely be enlarged, nor the balls extracted without great pain and danger, they must be left in the wound, either till the pain is abated, or the passage rendered so easy by suppuration, that they work themselves out. On the other hand, extraneous bodies are instantly to be removed, where there is danger of bringing on convulsions, pain, and an inflammation, by being left behind. If a ball has passed into any of the cavities of the body, where the extraction of it cannot be attempted with safety, it is best to leave it where it has lodged, and to heal the wound: for there have been variety of instances, where persons have carried balls within them for many years, without suffering any inconvenience. Balls lodged in the bones, are to be extracted with restrained forceps, observing the same rules and directions we have already laid down. When this cannot be done, they may be laid hold of with a sort of trepan necessary to extract balls that are lodged in bones, and that are covered with a large quantity of flesh, as in the thigh bone; but if the ball is so strongly fixed in the bone, as to resist all these methods, it must be left there till the parts suppurate, and set it at liberty. Balls that are thrown into the joints are to be removed with all expedition, for delays are here extremely dangerous; but it is scarce possible to prevent violent pains, inflammations, and caries of the bones, which generally require amputation of the limb. In wounds from large guns, the joint or bone is frequently grievously shattered, or carried off; in this case, it is far better to take off the limb at once, than to spend a great deal of time in fruitless attempts to cure it; for the natural figure of the shattered joint can never be restored, and the branches of nerves that were sent to the bone, and the insertion of the tendons and ligaments being torn from it in many places, cannot but bring on violent inflammations and a gangrene; but where the bones are not violently shattered and broken, the surgeon should be

careful in time to remove the splinters, and all extraneous bodies, and to treat the wound according to the rules prescribed above : lastly, if any large artery is wounded, either in the arms or legs, which will appear by the loss of blood, the tourniquet should be applied, and the blood being stopped, you must endeavour to take up the vessel, by the assistance of the crooked needle ; but if this cannot be done, or if the condition of the wound will allow no hopes of success from the future dressings, it will be proper to take off the limb a little above the wound.

The wound being cleaned, and the blood stopped, the first intention is to use our utmost endeavours to prevent or assuage the tumour and inflammation. The wound should be dressed up with lint dipped in spirits of wine warmed, covering it up with compresses wet with the same liquor, or with camphorated spirit of wine, either alone, or diluted with aqua calcis. Having done this, the next intention is to forward the suppuration of the bruised and torn parts, and then to fill up the wound with new flesh, neatly cicatrized ; for the method of doing which, see the articles SUPPURATION and WOUND.

In gun-shot wounds, several grains of powder frequently penetrate the skin of the face, and occasion deformity, if they are not taken out : which may be done with a pin, or an instrument like an ear-picker : but if they are got in too deep to be picked out in this manner, the skin must be laid open with a fine small lancet, in order to get at them with the instruments we have described. Great care should be taken not to break the grains in taking them out ; for that will occasion very foul spots.

**GUNSTBERG**, a town of Germany, in the circle of Swabia, situated on the east side of the Danube : east long.  $10^{\circ} 15'$ , north lat.  $48^{\circ} 35'$ .

**GUNTER'S LINE**, a logarithmic line, usually graduated upon scales, sectors, &c. See SCALE and SECTOR.

It is also called the line of lines, and line of numbers ; being only the logarithms graduated upon a ruler, which therefore serves to solve problems instrumentally in the same manner as logarithms do arithmetically. It is usually divided into an hundred parts, every tenth whereof is numbered, beginning with 1, and ending with 10 ; so that if the first great di-

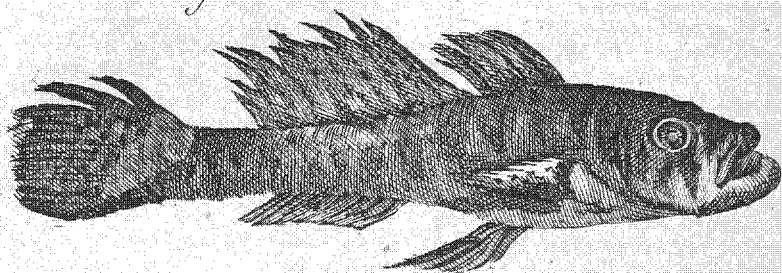
vision, marked 1, stand for one tenth of any integer, the next division, marked 2, will stand for two tenths ; 3, three tenths, and so on ; and the intermediate divisions will, in like manner, represent 100th parts of the same integer. If each of the great divisions represent 10 integers, then will the lesser divisions stand for integers ; and if the great divisions be supposed each 100, the sub-divisions will be each 10.

*Use of GUNTER'S LINE.* 1. *To find the product of two numbers.* From 1 extend the compasses to the multiplier ; and the same extent, applied the same way from the multiplicand, will reach to the product. Thus if the product of 4 and 8 be required, extend the compasses from 1 to 4, and that extent laid from 8 the same way, will reach to 32, their product. 2. *To divide one number by another.* The extent from the divisor to unity, will reach from the dividend to the quotient : thus to divide 36 by 4, extend the compasses from 4 to 1, and the same extent will reach from 36 to 9, the quotient sought. 3. *To three given numbers, to find a fourth proportional.* Suppose the numbers 6, 8, 9 ; extend the compasses from 6 to 8, and this extent, laid from 9 the same way, will reach to 12, the fourth proportional required. 4. *To find a mean proportional between any two given numbers.* Suppose 8 and 32 : extend the compasses from 8 in the left-hand part of the line, to 32 in the right ; then bisecting this distance, its half will reach from 8 forward, or from 32 backward, to 16, the mean proportional sought. 5. *To extract the square root of any number.* Suppose 25 : bisect the distance between 1 on the scale and the point representing 25 ; then the half of this distance, set off from 1, will give the point representing the root 5. In the same manner the cube root, or that of any higher power, may be found by dividing the distance on the line, between 1 and the given number, into as many equal parts as the index of the power expresses ; then one of those parts, set from 1, will find the point representing the root required.

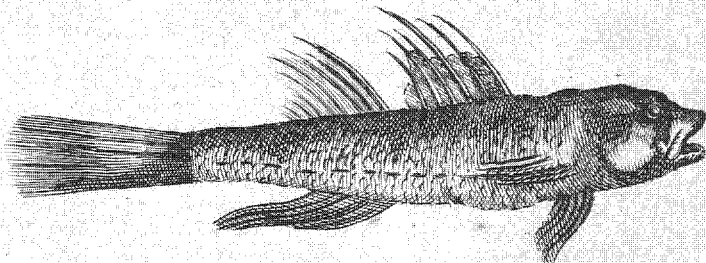
**GUNTER'S QUADRANT**, one made of wood, brass, &c. containing a kind of stereographic projection of the sphere, on the plane of the equinoctial ; the eye being supposed placed in one of the poles. Besides the use of this quadrant in finding heights and distances, it serves also



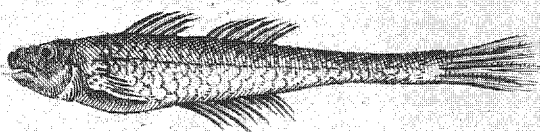
*Fig. 1. G O B I U S. N<sup>o</sup> 1.*



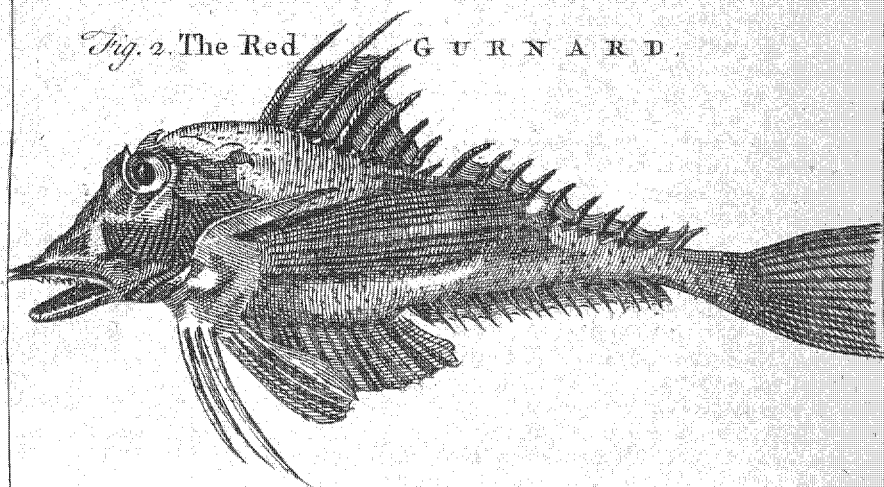
*N<sup>o</sup> 2.*



*N<sup>o</sup> 3.*



*Fig. 2. The Red G U R N A R D.*



to find the hour of the day, the sun's azimuth, and other problems of the globe. See the article **QUADRANT**.

**GUNTER'S SCALE**, called by navigators simply the **gunter**, is a large plain scale, generally two feet long, and about an inch and a half broad, with artificial lines delineated on it, of great use in solving questions in trigonometry, navigation, &c. See the article **SCALE**.

**GUN-WALE**, or **GUNNEL**, is the uppermost wale of a ship, or that piece of timber which reaches on either side from the quarter-deck to the forecabin, being the uppermost bend which finishes the upper works of the hull, in that part in which are put the stanchions which support the waste-trees.

**GURIEL**, a subdivision of Georgia, in Asia, situated on the eastern coast of the Euxine-sea.

**GURK**, a city of Carinthia, in Germany: east long.  $14^{\circ}$ , north lat.  $47^{\circ} 20'$ .

**GURNARD**, in ichthyology, the english name of two species of trigla. See the article **TRIGLA**.

These fishes, from their different colours, are called the grey and red gurnard. The grey gurnard has a bifid and spinose snout, with two spines at each eye. The red kind has likewise the rostrum bifid, and the coverings of the gills striated, and each of them armed with three spines. This last is a very remarkable spinose fish, which seldom exceeds a foot in length. See plate **CXXIII**. fig. 2.

Both these fishes make a singular noise, when out of the water, not unlike the grunting of a hog; whence their english name.

**GUSSET**, in heraldry, is formed by a line drawn from the dexter or sinister chief points, and falling down perpendicularly to the extreme base. See plate **CXXI**. fig. 7.

The gusset is an abatement of honour, denoting an effeminate person. See the article **ABATEMENT**.

**GUSTROW**, a town of Germany, in the dutchy of Mecklenburg: east long.  $12^{\circ} 15'$ , north lat.  $54^{\circ}$ .

**GUTS**, or **INTESTINES**, in anatomy. See the article **INTESTINES**.

**GUTSKROW**, a city of Germany, in the circle of Upper Saxony, and province of Swedish Pomerania: east long.  $13^{\circ} 40'$ , north lat.  $54^{\circ}$ .

**GUTTA**, a town of Hungary, situated on the east side of the Danube: east long.  $18^{\circ}$ , north lat.  $48^{\circ} 20'$ .

**GUTTÆ ANGLICANÆ**, volatile english drops. See the article **DROPS**.

**GUTTÆ**, in architecture, are ornaments in the form of little cones, used in the plafond of the doric cornice, or on the architrave underneath the triglyphs, representing a sort of drops or bells. They are usually six in number. See the article **DORIC**.

**GUTTA SERENA**, a disease in which the patient, without any apparent fault in the eye, is entirely deprived of sight.

Its cause is ascribed to an obstruction of the optic nerve, which may proceed from a palsy in the nerve, from a suppression of usual hæmorrhages, from ulcers healed too soon, or from an epilepsy.

Heister affirms, that it is to be cured by aromatics, carminatives, and attenuants; chiefly eye-bright, veronica, hyssop, rose-mary-flowers, sage, fennel and anniseeds, valerian-root, saffra, cinnamon and wood-lice, either in infusion, or in powder. The juice of wood-lice newly expressed, and taken for some weeks, increasing the dose, is of excellent use; as likewise mercurials, and sometimes a salivation. If it arises from a suppression of usual hæmorrhages, they are to be restored; but if this cannot be done, artificial bleeding is to be substituted. Coward recommends volatiles, antiscorbutics, chalybeats, mercurials, cephalics, and nervine medicines.

Externally, issues, setons, and clysters, are said to be good, especially in the phlegmatic; but if the patient is plethoric, cupping and bleeding, particularly cauteries, or issues on the coronal suture, or in the neck, are proper: and the eyes may be washed with fennel, valerian, eye-bright, or rose-water: or an infusion of fennel-roots in wine, with bags of strengthening herbs and fennel-seeds, may be put upon them. Sneezing powders may likewise be proper, especially florentine orris, or horse-chestnuts. An old gutta serena, however, is generally incurable.

**GUTTE**, or **GUTTY**. See **GUTTY**.

**GUTTERS**, in architecture, a kind of canals in the roofs of houses, serving to receive and carry off the rain.

Gutters, with respect to their position, are of two kinds: such as come something near a parallelism with the horizon; and such as incline towards a vertical position to the horizon.

**GUTTER-TILES**, those intended for gutters. See the article **TILE**.

**GUTTURAL**, a term applied to letters or sounds pronounced or formed as it were in the throat. There are four guttural letters in the hebrew, viz. ע פ ת כ; which, for memory's sake, are termed *ahachah*. See the article **LETTER**.

**GUTTY**, *gutté*, in heraldry, a term used when any thing is charged or sprinkled with drops.

In blazoning, the colour of the drops is to be named, as gutty of sable, of gules, &c.

**GUY**, in a ship, is any rope used for keeping off things from bearing or falling against the ship's sides when they are hoisting in.

That rope which at one end is made fast to the fore-mast, and seized to a single block at the pendant of the garnet, is called the guy of the garnet.

**GUY'S HOSPITAL**. See **HOSPITAL**.

**GUZES**, in heraldry, roundles of a sanguine or murrey colour. These, from their bloody hue, are by some supposed to represent wounds.

**GUZURAT**, the same with Cambaya. See the article **CAMBAYA**.

**GYMNASIARCH**, *γυμνασιάρχης*, in antiquity, the director of the gymnasium. He had two deputies under him; the one called *xytarch*, who presided over the *athletæ*, and had the oversight of the wrestling; the other, *gymnastes*, who had the direction of all the other exercises.

**GYMNASIUM**, *γυμνασιον*, in grecian antiquity, a place fitted for performing exercises.

Gymnasia, according to Potter, were first used at Lacedæmon, but were afterwards very common in all the parts of Greece, and imitated, very much augmented, and improved at Rome. They were not single edifices, but a knot of buildings united, being so capacious as to hold many thousands of people at once, and having room enough for philosophers, rhetoricians, and the professors of all other sciences, to read their lectures; and wrestlers, dancers, and all others that would, to exercise at the same time without the least disturbance or interruption. They consisted of a great many parts, the chief of which were the *porticos*, *elæothesium*, *palæstia*, *conistrium*, &c. See the articles **PORTICO**, **ELÆOTHESIUM**, &c.

Athens had several gymnasia, of which the lyceum, academia, and cynosarges, were those of most note.

The lyceum was situated upon the banks of the river Ilissus, and received its name

from Apollo *λυκίστονος*, or *λυκισ*, to whom it was dedicated.

The lyceum was the place where Aristotle taught philosophy, walking there every day till the hour of anointing; whence he and his followers got the name of peripatetics, from *περιπατεῖν*, to walk. The academy was part of the ceramicus without the city, where Plato lectured. See the article **ACADEMY**.

The cynosarges was a place in the suburbs, near the lyceum, so called from a white or swift dog, *κυν αργος*. Here Antisthenes instituted a sect of philosophers called cynics, from the name of the place.

**GYMNASTICS**, the art of performing the several bodily exercises, as wrestling, running, fencing, dancing, &c. See the article **WRESTLING**, &c.

That part of medicine which regulates the exercises of the body, whether for preserving or restoring health, is also termed gymnastic.

**GYMNIC**, something belonging to the athletic exercises; for an account of which, see the articles **PENTATHLON**, **OLYMPIC**, **ISTHMIAN**, &c.

**GYMNOPÆDIA**, a dance used by the antient Lacedæmonians, and performed during their sacrifices by young persons naked, who at the same time sung a song in honour of Apollo.

**GYMNOPYRIS**, in natural history, a name given by Dr. Hill to the pyritæ of a simple internal structure, and not covered with a crust.

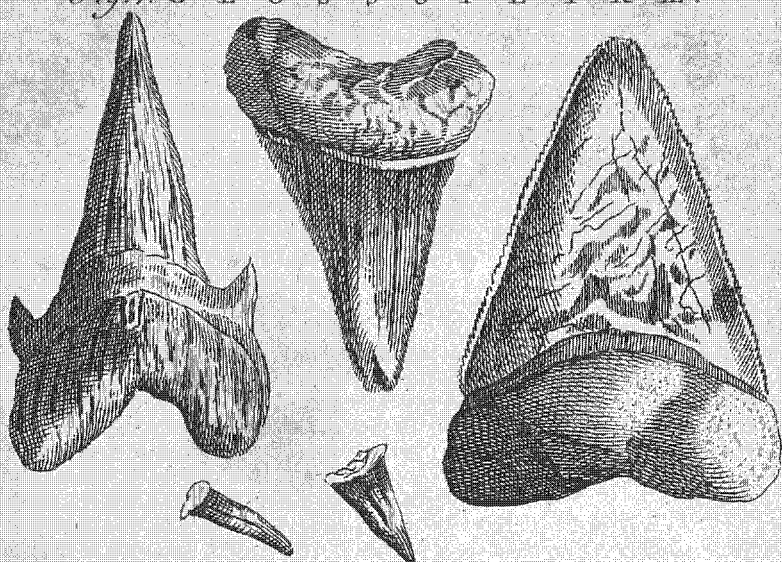
Of these there are only two species. 1. A green variously shaped kind. 2. A botryoide kind. See **PYRITÆ**.

The first species is the most common of all the pyritæ, and appears under a great diversity of shapes. It is very hard and heavy, very readily gives fire with steel, but will not at all ferment with aquafortis. The second species is very elegant and beautiful, and its usual colour is a very agreeable pale green; but what most distinguishes it from all other pyritæ is, that its surface is always beautifully elevated into tubercles of various sizes, resembling a cluster of grapes. See plate **CXXIV**. fig. 3.

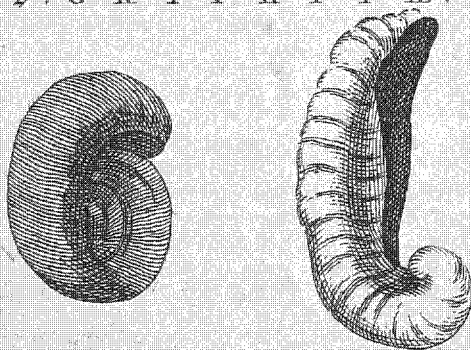
**GYMNOSOPHISTS**, a sect of philosophers who clothed themselves no farther than modesty required. There was some of these sages in Africa; but the most celebrated clan of them was in India. The african gymnosophists dwelt upon a mountain in Ethiopia, near the Nile, without the accommodation either

of

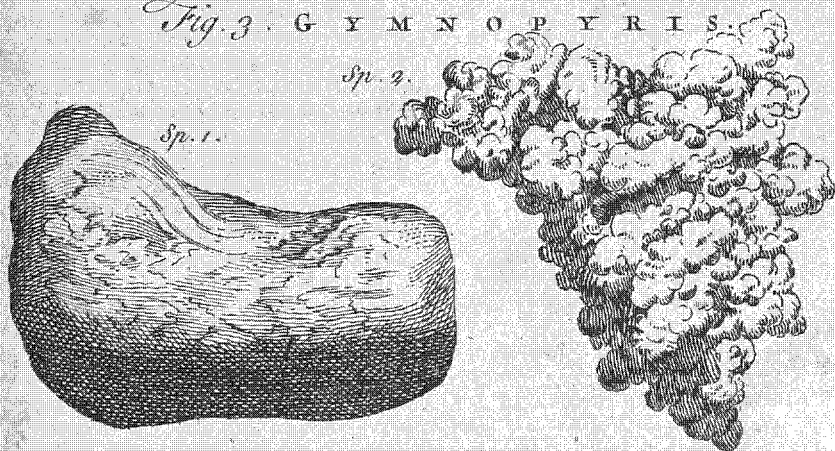
*Fig. 1.* G L O S S O P E T R Æ.



*Fig. 2.* G R Y P H I T Æ.



*Fig. 3.* G Y M N O P Y R I S.







of house or cell. They did not form themselves into societies like those of India, but each had his private retirement, where he studied and performed his devotions by himself. If any person had killed another by chance, he applied to these sages for absolution, and submitted to whatever penances they enjoined. They observed an extraordinary frugality, and lived only upon the fruits of the earth. Lucan ascribes to these gymnosophists, several new discoveries in astronomy.

As to the indian gymnosophists, they dwelt in the woods, where they lived upon the wild products of the earth, and never drank wine, nor married. Some of them practised physic, and travelled from one place to another: these were particularly famous for their remedies against barrenness. Some of them, likewise, pretended to practise magic, and to foretell future events.

In general, the gymnosophists were wise and learned men: their maxims and discourses, recorded by historians, do not in the least savour of a barbarous education, but are plainly the result of great sense, and deep thought. They kept up the dignity of their character to so high a degree, that it was never their custom to wait upon any body, not even upon princes themselves; for which reason Alexander, who would not condescend to visit them in person, sent some of his courtiers to them in order to satisfy his curiosity. Their way of educating their disciples, is very remarkable. Every day, at dinner, they examined them how they had spent the morning; and every one was obliged to shew, that he had discharged some good office, practised some virtue, or improved in some part of learning: if nothing of this appeared, he was sent back without his dinner. They held a transmigration of souls; and it is probable that Pythagoras borrowed his doctrine from them.

**GYMNOSPERMIA**, in botany, a series or sub-division of the *didynamia* class of plants; comprehending all those with labiated flowers, without any pericarpium or capsule surrounding their seeds, which are only lodged in the base of the cup; whence the name gymnospermia. See the article **DIDYNAMIA**.

**GYMNOTUS**, in ichthyology, a genus of malacopterygious fishes, without any back or belly-fins, and with only five bones in the membrane of the gills.

There is only one known species of this genus, the carapo of Marcgrave.

**GYNÆCEUM**, among the ancients, the apartment of the women, a separate room in the inner part of the house, where they employed themselves in spinning, weaving, and needle-work.

**GYNÆOCRACY**, *γυναικραπεία*, denotes the government of women, or a state where women are capable of the supreme command. Such are Britain and Spain. **GYNANDRIA**, in botany, the name of one of Linnæus's classes of plants, the twentieth in order; comprehending all the plants whose stamina are placed either on the style or on the receptacle, elongated into the form of a style, and carrying on it both the pistil and stamina. See the article **BOTANY**.

Of the several genera of this class, some have two stamina to each flower; some, again, have three; and others, four, five, six, ten, or more. And hence they are naturally arranged into several distinct orders, under the appellations of gynandria-diandria, gynandria-triandria, &c.

**GYNGLIMUS**, or **GINGLYMUS**, in anatomy. See the article **GINGLYMUS**.

**GYPSUM**, or **PLASTER-STONE**, in natural history, a genus of fossils naturally and essentially simple, not inflammable nor soluble in water, and composed of small flat particles; which form bright, glossy, and in some degree transparent masses, not flexible or elastic, not giving fire with steel, nor fermenting with or being soluble in acid menstrua, and very easily calcining in the fire.

Of these gypsums, some are harder, others softer; and are of several colours, as white, grey, red, green, &c. sometimes distinct, and sometimes variously blended together.

The texture of all the gypsums being ultimately the same, it may be sufficient to observe, that their origin is plainly from particles of a determinate nature and substance, and of a certain and invariable figure, an oblong, flat, and irregularly angular one. These we sometimes see, as indeed is most natural to them, disposed without order or regularity, into loose, complex, friable masses; at others, they are getting out of their native order, and emulating the structure of other classes of bodies, of which they are indeed properly the basis, and appearing somewhat in the figure of the fibrariæ; and at other times, of the foliaceous composite flakes of the selenitæ:

the

The species which have these structures, are truly varying from the gypsums into those bodies they emulate; for the fibrariæ are only a peculiar arrangement of these very particles, and the selenitæ only more broad flakes of the same, like those of the foliaceous talcs.

The gypsums are much used in plaster, for stuccoing rooms, and casting busts and statues.

**GYP SUM STRIATUM**, *striated plaster-stone*,

the whitish, less glossy tricheria, with short thick filaments. See **TRICHERIA**.

**GYRFALCON**, or **GERFALCON**. See the article **GERFALCON**.

**GYRLE**, or **GIRLE**, among sportsmen. See the article **GIRLE**.

**GYSHORN**, a town of Germany, in the dutchy of Lunenburg, situated on the river Aller, forty-five miles north-east of Hanover: east long. 10° 45', north lat. 52° 50'.



## H.

**H**, or *h*, the eighth letter, and sixth consonant in our alphabet; tho' some grammarians will have it to be only an aspiration, or breathing. But nothing can be more ridiculous than to dispute its being a distinct sound, and formed in a particular manner by the organs of speech, at least in our language: witness the words *eat* and *beat*, *arm* and *harm*, *ear* and *bear*, *at* and *bat*, &c. as pronounced with or without the *h*.

It is pronounced by a strong expiration of the breath between the lips, closing, as it were, by a gentle motion of the lower jaw to the upper, and the tongue nearly approaching the palate.

There seems to be no doubt, but that our *h*, which is the same with that of the Romans, derived its figure from that of the hebrew ה. And, indeed, the Phœnicians, most antient Greeks and Romans, used the same figure with our *H*, which in the series of all these alphabets keeps its primitive place, being the eighth letter.

**H**, used as a numeral, denotes 200; and with a dash over it, **H̄**, 200,000.

As an abbreviation, *H* was used by the antients to denote *homo*, *hæres*, *hora*, &c. Thus *H. B.* stood for *hæres bonorum*; and *H. S.* corruptly for *L. L. S.* a letter; and *H. A.* for *Hadrianus*.

**HAAG**, a town of Germany, and circle of Bavaria, thirty-two miles north-west of Munich.

**HAAK**, or **HAKE**, in ichthyology. See the article **HAKE**.

**HABAT**, the north-west province of the

empire of Morocco, situated on the freights of Gibraltar.

**HABBAKUK**, or the prophecy of *Hab-bakuk*, a canonical book of the Old Testament.

There is no mention made in scripture, either of the time when this prophet lived, or of the parents from whom he was descended; but according to the authors of the lives of the prophets, he was of the tribe of Simeon, and a native of Beth-zacar. As he foresaw the taking of Jerusalem by Nebuchadnezzar, he fled to Ostracin in Arabia, where he lived for some time; but after the Chaldæans had made themselves masters of Jerusalem, and were on their return home, he returned into Judæa, where he employed himself in agriculture; but as he was carrying the reapers their dinner, he is said to have been transported by an angel to Babylon, with what he had provided for his people in the field; which he set before Daniel, who was shut up in the lion's den, and was transported back again to Judæa, where he died, before the end of the captivity.

He is reported to have been the author of several prophecies which are not extant: but those that are indisputably his, are contained in three chapters. In these the prophet complains very pathetically of the disorders which he observed in the kingdom of Judæa. God reveals to him, that he would shortly punish them in a very terrible manner by the arms of the Chaldæans. He foretels the conquests of Nebuchadnezzar, his metamorphosis, and death. He foretels, that the vast

designs of Jehoiakim would be frustrated. He speaks against a prince (probably the king of Tyre) who built with blood and iniquity; and he accuses another king (perhaps the king of Egypt) of having intoxicated his friend, in order to discover his nakedness. The third chapter is a song or prayer to God, whose majesty he describes with the utmost grandeur and sublimity of expression.

**HABDALA**, a ceremony of the Jews, observed on the sabbath in the evening, when every one of the family is come home. At that time, they light a taper, or lamp, with two wicks at least: the master of the family then takes a cup with some wine, mixed with fragrant spices; and, after having repeated a passage or two of scripture, as, for example, "I will take the cup of salvation, &c." Psal. cxvi. and, "The Jews had light and gladness, &c." Esth. viii. he blesses the wine and spices. Afterwards he blesses the light of the fire, and then casts his eyes on his hands and nails, as remembering that he is going to work. The whole is intended to signify that the sabbath is over, and is from that moment divided from the day of labour which follows. For this reason the ceremony is called habdala, which signifies distinction.

**HABEAS CORPORA**, in law, a writ issued for bringing in a jury, or such of them as refuse to appear upon the venire facias, for the trial of a cause brought to issue.

It commands the sheriff to have the jurors before the judges on such a day, &c. and is of the same nature in the common pleas, as the *distingas juratores* in the court of king's bench.

**HABEAS CORPUS**, in law, is a writ of two kinds, the one being the great writ of the english liberty, which lies where a person is indicted for any crime or trespass before justices of the peace, or in a court of any franchise, and on being imprisoned, has offered sufficient bail, which has been refused, though the case be bailable; in which case he may have this writ out of the king's bench, in order to remove himself thither, to answer the cause at the bar of that court.

The practice in this case, is first to procure a *certiorari* out of the court of chancery, directed to all the justices for removing the indictment into the king's bench; and upon that to obtain this writ, directed to the sheriff, for causing the

body of the party to be brought at a certain day.

The other kind of habeas corpus is used for bringing the body of a person into court, who is committed to any goal or prison, either in criminal or civil causes; which writ will remove the person and cause from one court and prison to another.

No habeas corpus, or other writ, to remove a cause from out of an inferior court, can be allowed, if the same be not delivered to the judge of the court, before the jury who are to try the cause have appeared, and before any of them are sworn, 43 Eliz. c. 5.

The habeas corpus act, 31 Car. II. c. 2. has ordained, that a person may have a habeas corpus from any judge, on complaint made and view of the warrant of commitment, (except such person is committed for treason or felony expressed in the warrant, or some other offence that is not bailable) which habeas corpus must be made returnable immediately; and on producing a certificate of the cause of commitment, the prisoner is to be discharged on bail given to appear in the court of king's bench the next term, or next assizes, &c. Persons committed for either treason or felony, expressly mentioned in the warrant, upon a motion made in open court, in the first week of the term, or day of sessions, &c. after commitment, are to be brought to trial; and if they are not indicted the next term or sessions after commitment, on a motion made the last day of that term, they shall be let out upon bail, except it appear on oath that the king's witnesses are not ready; and in case they are not indicted or tried the second term after commitment, they shall be discharged.

Judges denying a habeas corpus, shall forfeit 500*l.* and if an officer refuse to obey it, or to deliver a true copy of the commitment-warrant, he forfeits 100*l.* for the first offence.

**HABEAS CORPUS AD PROSEQUENDUM**, a writ for the removal of a person in order to prosecution and trial in the proper county.

**HABEAS CORPUS AD FACIENDUM ET RECEPIENDUM**, a writ issued out of the court of common pleas, on behalf of defendants sued in inferior courts, to remove their cause into the said court.

**HABEAS CORPUS AD RESPONDENDUM**, a writ that lies where a person is imprisoned at another's suit in any prison except that of the king's bench; and a third person would

would sue the prisoner there, in which case this writ will remove such prisoner from the prison where he is, into the king's bench, to answer the action in that court.

**HABEAS CORPUS AD SATISFACIENDUM**, a writ that lies against a person in the fleet-prison, &c. to charge him in execution. The delivery of this writ to the warden, is sufficient.

**HABENDUM**, in law, a term signifying to have and to hold.

A deed or conveyance has two principal parts; the premises and the habendum. The office of the first is to express the names of the grantor, the grantee, and the things granted: that of the habendum, to shew what estate or interest the grantee is to have in what is granted. According to lord Coke, the habendum is to limit the estate, so that the general implication, which by construction of law passes in the premises, is by the habendum controlled and qualified. Thus in a lease to two persons, to have and to hold to the one for life, alters the implication of the joint tenancy in the freehold, which would pass by the premises, were it not for the habendum.

**HABERDASHER**, in commerce, a seller of hats, or of small wares.

The master and wardens of the company of haberdashers in London, calling to their assistance one of the company of cappers, and another of the hat-makers, and mayors, &c. of towns, may search the wares of all hatters that work hats with foreign wool, and have not been apprentices to the trade, or who dye them with any thing but copperas and galls, or woad and madder; in which case they are liable to penalties, by stat. 8 Eliz. c. 7. and 3 Geo. II. c. 22.

**HABERE FACIAS POSSESSIONEM**, a writ that lies where one has recovered a term for years in an action of ejectment, in order to put him into possession again.

The sheriff is obliged to execute this writ, and may raise the posse comitatus to assist him, in case he be opposed. He may also break open a house into which entrance is denied, to deliver possession to the person recovering by law. But an action of the case lies against him, if he deliver possession of more than is contained in the writ.

**HABERE FACIAS SEISINAM**, a writ which lies where a person has recovered land in the king's court; directed to the sheriff,

commanding him to give seisin of the land recovered.

This writ sometimes issues out of the records of a fine, and requires the sheriff to give the cognisee, or his heirs, seisin of the land in which the fine is levied.

There is likewise a writ called, *habere facias seisinam*, ubi rex habuit annum, diem & vastum, that lies for the delivery of lands to the lord of the fee, after the king has had his year, day and waste, in the lands of one convicted of felony.

**HABERE FACIAS VISUM**, is a writ that lies in divers cases, as in dower, foreclosure, &c. where it is necessary to take a view of the lands or tenements in question.

**HABERGION**, a small coat of mail, or only sleeves and gorget of mail, formed of little iron rings, or masses linked into each other. See the article *GORGET*.

**HABILIMENTS of war**, in our antient statutes, signify armour, harness, utensils, or other provisions for war, without which there is supposed no ability to maintain war.

**HABIT**, in philosophy, an aptitude or disposition either of mind or body, acquired by a frequent repetition of the same act.

This habit is by some of the schoolmen termed *habitus qualitativus*, a qualitative habit, and defined a quality adventitious to a thing, fitting and disposing it either to act or suffer. Others again define habit an affection of the mind or body, persisting by long use and continuance. Hence habits may be distinguished into those of the mind and of the body: thus virtue is called an habit of the mind; strength, an habit of the body. All natural habits, whether of body or mind, are no other than the body and mind themselves considered as either acting or suffering; or they are modes of the body or mind wherein either perseveres, till effaced by some contrary mode.

Custom, says Mr. Locke; settles habits of thinking in the understanding, as well as of determining in the will, and of motions in the body, all which seem to be but trains of motion in the animal spirit, which once set agoing, continue on in the same steps they have been used to, which by often treading are worn into a smooth path, and the motion in it becomes easy as well as natural. See *ASSOCIATION*. The archbishop of Cambray defines habits in general to be the certain impressions left in the mind, by means whereof we find a greater ease, readiness, and incli-

inclination to do any thing formerly done, by having the idea ready at hand to direct us how it was done before. Thus, for example, we form the habit of sobriety, by having always before us the inconveniencies of excess; the reflections whereof being often repeated, render the exercise of that virtue continually more and more easy.

Malebranche gives a more mechanical theory of habits. His principle is, that they consist in a facility which the spirits acquire of passing easily from one part of the body into another. He argues thus: if the mind act on, and move the body, it is in all probability by means of a stock of animal spirits lodged in the brain, ready to be sent at the motion of the will, by means of the nerves which open or terminate in the brain; into the muscles of the body.

Now an influx of spirits into a muscle occasions a swelling, and of course a shortening of the muscle, and consequently a motion of that part to which the muscle is fastened. Further, the spirits do not always find all the roads open and free through which they are to pass: whence that difficulty we perceive of moving the fingers with that quickness necessary to play on a musical instrument, or of moving the muscles necessary to pronounce the words of a foreign language. But by degrees the spirits, by their continual flux, smooth the way so, that at length they meet with no resistance at all. Now it is in this facility the spirits find of passing, when directed into the members of the body, that habits consist.

**HABIT**, in medicine, denotes the settled constitution of the body, or the habitude of any thing else, as the structure or composition of a body, or the parts thereof.

**HABIT** is also used for a dress or garb, or the composition of garments, wherewith a person is covered; in which sense we say, the habit of an ecclesiastic, of a religious, &c. a military habit, &c.

The different habits and cloths that the generality of the world wear, are, through inadvertency and inattention, very frequently the cause of very unhappy maladies. The antients have observed the inconveniencies of many parts of dress; and daily observations confirm to us the many mischiefs the ladies suffer from the stiff whale-bone stays they wear, and the disorders of the viscera of the lower belly to which these are subject who lace them-

selves too tightly; and this is not only of dangerous consequence to themselves, but frequently is the death of children in breeding women. The tight binding of the neck by the mens neck-cloths, stocks, or the too tight collars of their shirts, &c. has been very frequently the occasion of very terrible disorders of the head, the eyes, and the breast; deafness, vertiges, faintings, and bleedings at the nose, are the frequent consequences of this practice. Mr. Winslow has observed, that the different motions of the bones of the foot, which are very free in their natural state, as is very plainly seen in young children, are usually wholly lost to us as we grow up, by means of the improper pressure of our shoes. The high-heeled shoes the women wear, entirely changes the natural conformation of the bones of the whole foot.

**HABITATION**, or **COHABITATION**, in law. See the article **COHABITATION**.

**HABITUAL**, something grown to a habit by long use. See the article **HABIT**.

**HABITUAL GRACE**, among divines. See the article **GRACE**.

**HABITUDE**, among schoolmen, the respect or relation one thing bears to another. See **RELATION**.

Some of the more precise schoolmen consider habitude as a genus, and sub-divide it into two species; where it is considered as quiescent, they call it respect; where as moved, relation: to which some add a third species, considered in respect of figure, which they call mode. See the article **RELATION**, &c.

**HABITUDE** is also used by philosophers for what we commonly call habit, or a certain disposition or habitude for the performing or suffering certain things, acquired by repeated acts of the same kind.

**HACHA**, a town of Terra firma, in South America, situated on the north sea, at the mouth of the river Hacha, in west long. 72°, north lat. 11° 30'.

**HACKNEY**, a village on the north-east side of London, with a handsome church, three meeting-houses, and seventeen almshouses.

**HACKNEY-COACH**. See **COACH**.

**HADDINGTON**, a parliament-town of Scotland, about eighteen miles east of Edinburgh.

**HADDOCK**, the english name of a well known fish of the gadus-kind, with a bearded mouth, and three fins on the

**back**: its body is whitish; the upper jaw longest, and the tail a little forked.

See the article **GADUS**.

**HADÉ**, among miners, signifies the steep descent of a shaft, or the like passage.

**HADEMAR**, a town of Germany, in the circle of the upper Rhine, and county of Nassau in the Weteraw, situated in 7° 45' east long. and 50° 26' north lat.

**HADERSLEBAN**, a town of Sleswick, or south Jutland, situated near the sea called the little Belt, in east long. 10°, north lat. 55° 15'.

**HADLEY**, a market-town of Suffolk, situated seventeen miles south-east of Bury.

**HADRAMUT**, a city of Arabia Fælix, the capital of the province of Hadramut, situated in east long. 50° 30', north lat. 16°, three hundred and sixty miles north-east of Mocho.

**HÆMACHATES**, in natural history, the variegated, blood-coloured agat of the antients. See the article **AGAT**.

**HÆMAGOGOS**, among physicians, a compound medicine, consisting of fetid and aromatic simples, mixed with black hellebore; and prescribed in order to promote the menstrual and hæmorrhoidal fluxes, as also to bring away the lochia. See the article **MENSES**, &c.

**HÆMANTHUS**, **GUINEA-ORCHIS**, in botany, a genus of the *hexandria-monogynia* class of plants, the corolla whereof consists of a single petal, erect, and divided into six erect linear segments; the tube is very short, and angular: the fruit is a roundish berry, containing three cells; the seeds are single and triquetrous; the involucre has sometimes six leaves.

The flowers stand at the top in a kind of little umbel, and are of a very beautifully stellated appearance.

**HÆMATITES**, **BLOOD-STONE**, in natural history, an extremely rich and fine iron-ore. See **IRON**.

It is very ponderous, and is either of a pale red, a deeper red, or a bluish colour; usually of a very glossy surface; and when broken, of a fine and regularly striated texture: the striæ converging toward the center of the body; and the masses thereof naturally breaking into fragments of a broad base and pointed end; appearing sometimes pyramidal. The hæmatites is various in its degrees of purity and hardness, as well as in its figure: the finest and most pure is of a botryoid surface; the whole superficies rising into larger or smaller roundish tu-

bercles: sometimes the hæmatites is of a coarse texture, and a laxer structure, in which state it is known to many by the name schistus.

The hæmatites, besides its value as an ore, has its uses in medicine: the highest coloured and most like cinnabar that can be had, being esteemed astringent and delicate. It is given in powder from ten grains to five and twenty for a dose, in hæmorrhages; and is also used in distemperatures of the eyes.

**HÆMATOPUS**, the **SEA-PYE**, in ornithology, a distinct genus of birds of the order of the scolopaces, with a compressed beak, terminating in a wedge-like point. The hæmatopus is of the bigneis of the common magpye, and is so called from the colour of its legs, which are of a bright scarlet.

**HÆMATOSIS**, among physicians, the same with sanguification. See the article **SANGUINIFICATION**.

**HÆMATOXYLUM**, **CAMPECHE-WOOD** in botany, a genus of the *decandria-monogynia* class of plants, the flower of which consists of five equal and ovated petals; the fruit is a lanceolated, obtuse and unilocular, bivalve capsule, containing a few compressed, oblong seeds. See the article **CAMPECHE**.

**HÆMOPTOSIS**, **HÆMPTYSIS**, or **HÆMOPTOE**, in medicine, a spitting of blood.

An hæmptysis is either accidental or habitual, and is stopped by astringents, as bole-armenic, dragon's blood, and the lapis hæmatites, and best and most safely cured by the peruvian bark. In this disorder purging is to be avoided, but bleeding is convenient; diuretics and diaphoretics are of use, but opiates are excellent; in particular semen hyosciami is a noble specific, commended both by the antients and moderns, yet it is to be given with great precaution, in small quantities, and often repeated; for when given in too large a dose, it occasions a delirium: hederæ terrestris, or ground-ivy, produces marvelous effects.

In a desperate accidental hæmptysis, other things being tried in vain, (as in all other hæmorrhages) the expectation of the physician is seldom frustrated, if he makes use of the following remedy. Take plantain water and red wine, of each half a pound; syrup of poppies, half an ounce; to these add a very small quantity of the oil of vitriol, and make the whole up into a julep.

In cases of extremity, the fumes of quick lime and vinegar, are said to be very good.

**HÆMORRHAGE**, in medicine, a flux of blood from any part of the body.

Hæmorrhages are divided by medical writers into natural and preternatural.

Natural hæmorrhages comprehend bleeding at the nose, spitting of blood, the fluxes of the hæmorrhoids and menses, the lochia in lying-in women, vomiting of blood, and voiding of blood by urine.

The preternatural hæmorrhages are such as derive their origin from external accidents, as falls, blows, and wounds: some also comprehend under this term the artificial evacuations by bleeding, cupping, and the like.

Hæmorrhages differ much according to the age and state of the patient, and other accidents: hæmorrhages from the nose, are most frequent in young persons; those of the hæmorrhoids, in persons of a middle age, or later in life; the spitting of blood, to persons in a middle age; and voiding of blood by urine, usually to older people.

Some hæmorrhages are periodical, and others vague or uncertain. The first observe some stated periods of time for their return upon people: the last are wholly uncertain in that particular. Some are also termed critical; these are such as happen in the crisis of fevers. There are usually violent pains about those parts whence natural hæmorrhages are to proceed; but these always go off as soon as the bleeding comes on in due quantity. Young persons of a healthy and florid constitution, are most subject to hæmorrhages: people of plethoric habits, are also much subject to them; and especially such whose blood is sound and fluxile, not subject to any dyscrasy; those who drink much wine, or eat high seasoned food; and chiefly those persons who are subject to violent passions, especially anger: hence it is that brutes are rarely afflicted with them. The principal causes therefore of hæmorrhages are a plethora, violent commotions of the body, hot foods and liquors, a heat of the season, a sudden cooling of the body after violent heat, and passion.

As to the prognostics of hæmorrhages, it may in general be observed, that those proceeding from the lungs, vomiting, and voiding blood by urine, are all very dangerous. The others, when re-

gulated, and in due proportion, are salutary, and often prevent diseases. But the common custom of stopping them by astringents, or otherwise, is often productive of stagnations, inflammations, and violent fevers.

Natural hæmorrhages are more particularly,

**HÆMORRHAGE**, or **BLEEDING at the nose**, is owing to the more plentiful appulse of blood to the nostrils, by a stronger motion of the heart, whereby the small arteries in the pituitary coat become turgid, and too much distended, till at length they gape, and the blood gushes out. A bleeding at the nose may be promoted when persons of sedentary lives, that indulge their appetites, and so become plethoric, put their blood into extraordinary agitation, by any of the causes already mentioned, or by volatile medicines, hot baths, or suddenly chilling their feet, &c. This hæmorrhage differs much as to the quantity: some lose only a few drops, some several ounces, and some five or six pounds. No hæmorrhage is more apt to return; which it does to some in a few days, to others in a few hours. To the plethoric it is generally salutary; and there are many instances of a vertigo, scotomia, dull, heavy pains of the head, a phrensy, and even an epilepsy, being carried off by it. On the contrary, from its suppression there have arisen vertiges, apoplexies, epilepsies, convulsions, noise in the ears, hardness of hearing, and even a gutta serena.

But enormous and long continued bleedings at the nose, when they arise from spasms of the internal parts, and are preceded with coldness of the extreme parts, and fainting fits, generally occasion death: it is also dangerous in spotted and malignant fevers, and in chronical diseases. If the bleeding is very inordinate, it will be proper to use cooling emulsions, gentle or stronger opiates, to moderate the spastic strictures, as occasion shall require. Camphor mixed with nitre and calx of antimony, will be highly necessary, if the matter of exanthemata or cutaneous eruptions is the cause of the hæmorrhage, as is often the case. A revulsion may be made from the head by bleeding in the lower parts; then by temperate pediluvia, and putting the hands into warm water. After a revulsion by bleeding, there is nothing equal to nitre, to appease the orgasm of the blood; next to these are vegetable acids,

such as the juice of seville-oranges, barberries, the water and juice of wood sorrel; but more especially the diluted spirit of vitriol, tincture of roses, &c.

Externally refrigerants may be mixed with discutients, and applied to the forehead, nose, and neck. In persons of a bilious constitution, cold water alone drank freely, has a good effect.

**HÆMORRHAGE** of the *hæmorrhoids*, or of the *piles*. See **HÆMORRHOIDS**.

**HÆMORRHAGE** of the *lochia*, in lying-in women. See the articles **LOCHIA** and **DELIVERY**.

**HÆMORRHAGE** of the *menfes*. See the article **MENSES**.

**HÆMORRHAGE** of the *lungs*. See the articles **BLOOD** and **HÆMOPTOSIS**.

**HÆMORRHAGE** of the *urinary passages*, a disorder commonly called *pissing of blood*, being an emission of blood, with or without urine, from the vessels of the kidneys or bladder, which may be either enlarged, broken, or eroded; and is more or less dangerous, according to the different circumstances that attend it. If pure blood is voided suddenly, without interruption, and without pain, we conclude, says Hoffman, it proceeds from the kidneys. It likewise comes from the kidneys if the urine is coffee-coloured, or more florid, and generally precedes a fit of the gravel: it sometimes accompanies the passage of a stone through the ureter: but if the blood is of a dark colour, with or without purulent matter, emitted with heat and pain in the pubes, and in a small quantity, it certainly proceeds from the bladder. It may be occasioned by a stoppage of the hæmorrhoidal flux; from a violent motion of the body, especially riding; from a stone concealed in the kidney; from an erosion and ulcers of the bladder; from external violence; from gripping pains caused by violent purges; from sharp diuretics, especially cantharides.

All bloody urine has some degree of danger, but it is most so when mixt with purulent matter.

If the patient is plethoric, or it proceeds from a sanguineous evacuation, bleeding is necessary, as also cooling nitrous draughts, and purified nitre mixed with absorbents, with whey for a vehicle, or barley-broth, or small-beer acidulated with drops of the spirit of vitriol. The body must be kept open with laxatives, as rhubarb, with currants; or with cream of tartar; also emollient clysters. The

relaxed vessels must be agglutinated with decoctions of vulnerary herbs, such as agrimony, ground-ivy, yarrow, golden-rod, and the roots of comfrey dulcified with virgin-honey, to which milk may be occasionally added.

If there is an ulcer in the kidneys or bladder, medicines must be given that sheath the acrimony, such as syrup of marsh-mallows, also infusions of the vulnerary herbs above-mentioned, likewise of the barks of acacia, cherry-tree, and gum.

When grumous blood plugs up the passage of the ureter into the bladder, or the sphincter of the bladder, and occasions a difficulty or stoppage of urine, warm water drank plentifully, and baths of the same, are useful: likewise warm water should be injected into the bladder with a syringe, that the sharp humour may be diluted, and the grumes dissolved: but if the urine should be quite stopped with a spasm, then give emulsions of the four cold seeds, with crabs-eyes, and calx of antimony. Externally apply a bladder filled with a decoction of emollient flowers in milk to the abdomen, and keep the body open with manna, or an emollient oily clyster. Milk and whey are likewise excellent in these disorders, if a dram of bole armenic is taken in every draught.

It is an error of fatal consequence to give astringents in these disorders, which stop the flux too suddenly.

For such preternatural hæmorrhages as derive their origin from external accidents, as falls, blows, and wounds, see the articles **CONTUSION**, **WOUND**, **FISURE**, **CONTRAFFISURE**, &c.

For artificial hæmorrhages by bleeding, cupping, and the like, see the articles **PHLEBOTOMY**, **CUPPING**, &c.

For the critical hæmorrhages in fevers, &c. See the article **FEVER**, &c.

**HÆMORRHOIDAL**, an appellation given by anatomists to the arteries and veins going to the intestinum rectum. The internal hæmorrhoidal artery is a branch of the inferior mesenteric; and the external one, a branch of the iliac. The hæmorrhoidal veins are branches of the hypogastrics.

**HÆMORRHOIDS**, or **PILES**, in medicine, an hæmorrhage, or flux of blood from the hæmorrhoidal vessels. See **HÆMORRHAGE**, and **HÆMORRHOIDAL**. When the hæmorrhoidal vessels only swell, and discharge no blood, but are exceeding



exceeding painful, this is termed the blind piles.

All copious fluxes of the blood from the anus, are not to be reckoned of the morbus kind. For the habit of body, strength, age, and temperament, of the patient are to be considered. That which is enormous and excessive to one person, may be moderate and salutary to another. That only is to be esteemed pernicious, which continues too long, and enfeebles the patient, whereby the digestion, nutrition, and other functions are hurt, and there is reason to fear the production of dangerous chronic diseases. An extensive hæmorrhoidal flux is generally preceded by a heavy pressing pain of the back and loins: sometimes a numbness of the legs and thighs; a constriction of the external parts, with a slight shivering, and a subsidence of the vessels therein; a hard contracted pulse; a dryness of the mouth and fauces; the urine diminished in quantity, and most commonly pale; a sense of weight about the anus extending to the perinæum; a weakness of the stomach; a flatulency in the lower belly; a frequent desire to make water, and to go to stool; with sometimes an exclusion of a white bilious mucus; the old and weak have a *pro-cidentia ani*.

In this case the blood is generally at first black, and very grumous, and sometimes comes away in large clots from the varicous vessels; afterwards it becomes red, and at last serous: sometimes it is pituitous, or like the white of an egg. There are instances of voiding a pint or a quart of blood daily. It often continues long, from twenty to thirty, or even forty days.

The external or blind piles seldom bleed, but turn to painful varices, which being opened, weep a little, but will not yield much blood. But the internal piles, which are the off-spring of the splenic branch, and are extended to the inner substance of the rectum, and as far as the sphincter of the anus, together with the small arteries derived from the lower meseraic, not only bleed plentifully, but when the flux is suppressed create diseases of the liver, spleen, pancreas, mesentery and intestines.

The persons subject to this disease, are those of a loose, spongy texture, of a bulky size, who live high, and lead a sedentary life, or to whom it is hereditary: sharp purges, aloetics, high-seasoned

food, free drinking of sweet wines, neglect of customary bleeding, anger, sadness, hard riding, and the like, will usher in this disorder.

This hæmorrhage is dangerous, because it decays the strength, wastes the body, and produces a sense of weight in the thighs. The sleep is laborious, and the precordia oppressed, there is a rumbling in the belly, and a weak pulse. When it continues long, the ancles swell, and the countenance is ghastly. There is a straitness of breathing; and last of all, it terminates in a cachexy, dropsy, or a slow and hectic fever.

If the patient is plethoric, bleed, and let his drink be cold water of the chalybeate kind; or whey turned with orange juice, or juleps, made with tincture of roses, cooling waters, and syrup of roses; likewise nitre, in powder, with absorbents; and to appease the spasm, opiates of the mildest kind.

If it continues long, and the blood begins to grow serous, then give rhubarb with currants, and tamarinds, or which is much the same, with cream of tartar. Then gentle diaphoretics may be compounded of burnt hartshorn, calx of antimony, wine-vinegar, mixt with crabs-eyes, water of elder flowers, simple alexitereal water, and diascordium, or hot decoctions of yarrow, veronica, &c. may be taken in bed in order to sweat; also half a grain of camphor mixt with nitrous and bezoardic powders. The camphor may seem an inconsiderable dose, yet its efficacy is very great in disorders of this kind.

In the blind piles there is a most intense pain at the time of going to stool, and the excrements are tinged with blood: sometimes tumours like warts lie hid under the sphincter, or appear on the verge of the anus. Sydenham orders to take away ten ounces of blood from the arm; then to dissolve two drams of litharge, in four ounces of spring water, with which mix one scruple of thebaic extract. Dip a hot cloth in a little of this mixture, and apply it to the part; or if the tumour is within, inject a few spoonfuls of it with a syringe; the patient must abstain from flesh, drink barley water, and take diacodium every night.

Sometimes the veins in the blind piles are so much dilated with blood, as to be very painful, and raise tubercles as large as pease, grapes, or eggs: they appear livid and black from the stagnation of a thick

thick blood, and when pressed with the fingers, feel like a bladder filled with liquor. Some are soft and indulent, others hard, inflamed, and painful, rendering the patient unable to walk, sit, or stand, and produce such a spasm in the anus, as not to admit a clyster: sometimes they bleed, or turn to troublesome itching ulcers, and occasion an abscess, or a fistula.

According to Heister, linnen dipt in warm spirit of wine, and emollients, are of infinite service. Leeches may be also applied to exhaust the blood; if they are not at hand, and the parts are inflamed, the lancet must be used; then dressings must be made with lint, with compresses, and the T bandage. The tubercles, which are full and large, may be removed by a ligature, unless inflamed. Sometimes they are high in the rectum, and then a speculum ani must be used, in which case they must be either scarified with a lancet, or divided with scissars, that the thick noxious blood may be discharged, and the pains relieved.

**HÆMUS**, now called **RHODOPE**, a mountain that divides Bulgaria from Thrace, or Romania, in European Turkey.

**HÆREDE ABDUCTO**, an antient writ that lay for the lord, who having the wardship of his tenant while under age, could not come by his body, it being carried away by another person.

**HÆREDE DELIBERANDO**, &c. a writ directed to the sheriff, to require one who had the ward of another, to deliver him to the person whose ward he was, on account of his land.

**HÆREDE RAPTO**, or ravishment de gard. See the article **RAVISHMENT**.

**HÆRESY**, the crime of heretics. See the article **HERETIC**.

**HÆRETICO COMBURENDO**, a writ which formerly lay against one convicted of heresy by his bishop, and having abjured, afterwards fell into it again, or at least into some other, upon which he was committed into the hands of the secular power; and by virtue of this writ, upon a certificate of his conviction, he was burnt.

This writ was taken away by statute 29 Car. II. c. 9.

**HAERLEM**, a populous city of the United Provinces, in the province of Holland, situated near the lake which from this town is called Haerlem-Meer; four miles east of the ocean, and twelve west of

Amsterdam: east long. 4° 20', north lat. 52° 30'.

**HAGAI**, a canonical book of the Old Testament, so called from the prophet of that name, who, in all probability was born at Babylon, from whence he returned with Zerubbabel.

This prophet, by the command of God, exhorted the Jews, after their return from the captivity, to finish the rebuilding of the temple, which they had intermitted for fourteen years. His remonstrances had the desired effect; and to encourage them to proceed in the work, he assured them from God, that the glory of this latter house, should be greater than the glory of the former: which was accordingly fulfilled, when Christ honoured it with his presence; for, with respect to the building, this latter temple was nothing in comparison of the former.

**HAGENAU**, a fortified town of Germany, in the Landgraviate of Alsace: east long. 7° 40', north lat. 48° 45'.

**HAGGARD FALCON**, the greenish legged falcon, with a livid back. It is a large species, equal to a full grown hen in size. See the article **FALCON**.

**HAGIAZ**, a province of Arabia, whereof Mecca is the capital.

**HAGIOGRAPHIA**, or holy writings, a name given to a particular division of the Old Testament, as containing hymns to God, and moral precepts for the conduct of life. The books distinguished by this term were the Psalms, Proverbs, Ecclesiastes, and the Song of Solomon.

**HAGIOSIDERON**, in the greek church, a name given to an instrument made of iron, used by the Greeks, under the dominion of the Turks, to supply the place of bells, the use of which is prohibited. It is a plate of iron about three inches broad, and sixteen long, fastened by the middle to a chain or cord, and hung at the church door; on this they strike with an iron-hammer, with a kind of measure or cadence that is not disagreeable.

This is used to call the people to church; and it is also carried before the priest, in a procession of the sacrament to a sick person, when it is beat upon from time to time, to advertise the people to adore it, just as the romish church do with a bell.

**HAGUE**, a town of the United Provinces, in the province of Holland, situated two miles

miles east of the sea, and fourteen north-west of Rotterdam. This is one of the finest towns in Europe; but tho' it enjoys all the privileges of a city of Holland, except that of sending representatives to the states, yet as it has no walls, it is only esteemed a village. Here every city of the United Provinces has a house for their respective deputies, and here the states of the province of Holland assemble, and all public affairs are transacted.

**HAIL**, *grando*, in physiology, an aqueous concretion, in form of white or pellucid spherules, descending out of the atmosphere.

Hail is evidently no other than drops of rain congealed into ice. This happens when in their passage thro' the inferior air, they meet with nitrous particles, which are known to contribute greatly to freezing. Their magnitude is owing to a fresh accession of matter as they pass along. Hence we see the reason why hail is so frequent in summer, because at that time greater quantities of nitre are exhaled from the earth, and float up and down the air. See the articles **RAIN** and **FROST**.

**HAILBRON**, a city of Germany, in the Circle of Swabia, and duchy of Wirtemberg: east long. 9° north lat. 49° 10'.

**HAINAN**, or **AYNAN**, an island of an oval form, and about 300 miles in circumference, about fifty miles south of the continent of China, and subject to that emperor. It is situated between 107 and 120° of east long. and between 18 and 20° of north latitude.

**HAINAULT**. See **HAYNAULT**.

**HAINBURG**, a town of Germany, in the circle and archduchy of Austria, situated on the Danube, thirty-five miles east of Vienna: east long. 17° 8' north lat. 48° 20'.

**HAINES**, a river of the Austrian Netherlands, which runs from east to west thro' the province of Hainault, and falls into the Scheld at Conde.

**HAIR**, in physiology, slender, oblong, and flexible filaments, growing out of the pores of animals, and serving most of them as a covering.

When these filaments, in human subjects, grow on the body, they are denominated *pili*; when on the head, *capilli*. These last are most proper for examination: that part of them, which is without the skin, appears cylindric to the naked eye; but, when examined by the

help of glasses, it is found to be unequal and irregular, and often knotty. It is pellucid, but is not hollow; but the extremities of them are often split into several parts, so as to resemble a pencil. The part of the hair that is within the skin, is called the root of it; and, from its roundish figure, the bulb. This part is hollow and vasculous, in the manner of the bases of the young feathers on birds: this vasculous part is inclosed in a follicle, or case, and is most conveniently to be examined in the large hairs of a cat's whiskers, or in the beards of other animals.

The origin of the hair is in the cutis, and in the fat that lies underneath it; and probably from nerves, as an acute pain is felt in pulling them off. The nutritious matter of the hair is probably the same with that of the other parts of the body; not merely excrementitious, as the old authors have supposed. It is a common assertion, that the hair grows after a person is dead; but unquestionable experiments prove this to be of the number of vulgar errors, not at all the more true for being universally received as truth.

The colour of the hair is very different in different people of the same country; but there are also general differences of it, peculiar, in a manner, to the climates. In the hottest countries it is very black; in the colder, it is yellowish, redish, or brown; but in all places it grows grey or white with age; and in the labourers in copper mines, and others, who are continually receiving the effluvia of that metal, it becomes greenish. The length of the hair is, in the individual, very different. It is always much longer on the head than elsewhere. In general, it is short and curled under the torrid zone, and gradually longer in the more temperate climates. Its consistence to the touch, also, varies greatly, 1. In regard to the different climates and subjects. In general, it is harsher in the *Æthiopian* than in the *European*; and harder and drier in adults than in infants, whose habit abounds more with humidities. 2. In regard to the parts of the body on which it grows; it is very harsh and hard under the arm-pits, and about the pudenda: on the head it is much softer; and on all the other parts of the body it is greatly softer than there, and very short.

As to the time of the origination of the hair, that of some parts of the body is of the same date with the parts it grows on; such is that of the head, the eye-lashes, and eye-brows. That of others begins to grow only at a certain time; such is that of the beard, of the arm-pits, and of the pudenda: and in the same manner some of the hair continues always increasing in length, while other parts of it never grow after the birth of the infant.

The use of the hair of the head is to keep that part warm, as well as to be an ornament to it: that of the rest of the hair, except only that of the eye-brows and eye-lashes, is not so easily determined.

*Human-HAIR*, in commerce, makes a considerable article of trade, the goodness of which consists in its being neither too coarse, nor too slender.

Hair that does not curl or buckle naturally, is made to do so by first boiling, and then baking it. Having sorted it, they next roll it carefully upon pipes, hollowed in the middle; these they put into a pot or cauldron, and let them boil about two hours; then taking them out, they are dried and covered with papers; and, lastly, sent to the pastry-cook, who bakes them in an oven, till the crust with which they are covered is about three fourths baked.

The hair of several other animals, as the beaver, hare, coney, &c. is also used in commerce, and especially in the manufacture of hats. See the article *HAT*. As to the duties upon hair, that of camels pays, upon importation  $6\frac{93}{100}$ d. each pound; and draws back, upon exportation,  $6\frac{72\frac{1}{2}}{100}$ d. Cow or ox-hair,

pays  $7s. 2\frac{17\frac{1}{2}}{100}$ d. the 112 pounds; and draws back, upon exportation,  $6s. 5\frac{62\frac{1}{2}}{100}$ d. Elks-hair for saddles, the hundred weight, pays  $2s. 4\frac{87\frac{1}{2}}{100}$ d. and draws back, upon exportation,  $2s. 13\frac{11}{100}$ d. Ordinary goats-hair pays  $4\frac{57}{100}$ d. the pound; and draws back, upon exportation,  $4\frac{23\frac{3}{4}}{100}$ d. Goats-hair, otherwise called carmenia-wool, pays  $6\frac{44\frac{1}{2}}{100}$ d.

the pound; and draws back, upon exportation,  $6\frac{11\frac{1}{2}}{100}$ d. Horse-hair pays  $7\frac{18\frac{1}{2}}{100}$ d. the pound; and draws back, upon exportation,  $6\frac{46\frac{7}{8}}{100}$ d. Human hair

for perukes, pays  $1s. 7\frac{15}{100}$ d. the pound; and draws back, upon exportation,  $1s. 5\frac{25}{100}$ d.

*HAIR*, among farriers, is generally called the coat; and, with regard to horses, deserves particular consideration.

The hair growing on the fetlock, serves as a defence to the prominent part of it, in travelling in stony ways, or in frosty weather: if the hair of a horse's neck, and the parts most uncovered, be close, smooth and sleek, it is an indication of his being in health and good case. In order to make the hair of an horse soft and sleek, he must be kept warm at heart, for the least inward cold will cause the hair to stare; also sweat him often, for that will loosen, and raise the dust and filth that renders his coat foul; and when he is in the heat of a sweat, scrape off all the white foam, sweat and filth that is raised up, with an old sword blade; and also when he is blooded, if you rub him all over with his own blood, repeating it two or three days, and curry and dress him well, it will make his coat shine as if covered with a fine varnish.

Hair falling from the main or tail, is caused either by his having taken some heat, which has engendered a dry mange; or from some surfeit which causes the evil humours to resort to those parts. To cure this, anoint the horse's mane and crest with black soap; make a strong lee of ashes, and wash it all over with it. But if a canker should grow on a horse's tail, which will eat away both flesh and bone; then put some oil of vitriol to it, and it will consume it: and if you find that the vitriol corrodes too much, you need only to wet it with cold water, and it will put a stop to it.

If you would take away hair from any part of a horse's body; boil half a pound of lime in a quart of water, till a fourth part is consumed, to which add an ounce of orpiment; make this into a plaster, and lay it on.

*HAIR'S-BREADTH*, a measure of length, being the forty-eighth part of an inch.

*HAKÉ*, in ichthyology, the english name of the gadus, with two fins on the back, and

and the under jaw longest. It grows to two feet or more in length, but is the slenderest of all the gadi. See *GADUS*.

**HALABAS**, a city of the higher India, and capital of the province of Halabas, situated at the conflux of the rivers Ganges and Jemna: east long.  $85^{\circ}$  north lat.  $26^{\circ} 35'$ .

**HALBARD**, or **HALBERT**, in the art of war, a well-known weapon, carried by the serjeants of foot and dragoons.

It is a sort of spear, the shaft of which is about five feet long, and made of ash, or other wood. Its head is armed with a steel point, edged on both sides, not unlike the point of a two-edged sword. But besides this sharp point, which is in a line with the shaft, there is a cross piece of steel, flat and pointed at both ends; but generally with a cutting edge at one extremity, and a bent sharp point at the other; so that it serves equally to cut down, or push withal. It is also useful in determining the ground betwixt the ranks, and in adjusting the files of a battalion.

**HALBERSTAT**, a city of Germany, in the circle of Upper Saxony, the capital of the dutchy of the same name; subject to the king of Prussia, east long.  $11^{\circ} 6'$ , north lat.  $51^{\circ} 55'$ .

**HALBERT**, among farriers, is a small piece of iron an inch broad, and three or four inches long, soldered to the toe of a horse's shoe, to hinder a lame horse from treading on his toe.

These halbert-shoes necessarily constrain a lame horse, when he goes at a moderate pace, to tread or rest on his heel, which lengthens and draws out the back sinew, that was before in some measure shrunk.

**HALCRYPTIUM**, a name given by Dr. Hill, to the salt suspended in a fluid form, and in very small quantities, in mineral waters, scarce discernible by the taste, and with much difficulty separable from them; but, by proper management, may be procured in form of a dry powder; which, being carefully prepared by solution and evaporation, affords extremely minute, oblong, quadrangular crystals. The halcryptium, thus obtained, has all the properties of the common alkaline salts. See the article *ALKALI*.

All the chalybeate waters afford it; but none in such large quantities as that of Pyrmont. See the article *PYRMONT*.

**HALCYON**, in ornithology, a name given by the antients to the *lipida*, or king-fisher. See the article *KING-FISHER*.

**HALCYON DAYS**, *dies halcyonii*, in antiquity, a name given to seven days before and as many after the winter-solstice; by reason the halcyon, invited by the calmness of the weather, laid its eggs in nests built on the rocks, close by the brink of the sea, at this season.

**HALE**, in the sea-language, signifies pull; as to hale up, is to pull up; to hale in or out, is to pull in or out. To over-hale a rope, is to hale it too stiff, or to hale it the contrary way.

*Keel-HALE*. See the article *DUCKING*.

**HALEM**, a town of the Austrian Netherlands, in the province of Brabant, twenty-five miles west of Maestricht: east long.  $5^{\circ} 5'$  north lat.  $51^{\circ} 5'$ .

**HALESWORTH**, a market-town of Suffolk, thirty-five miles east of Bury: east long.  $1^{\circ} 40'$ , north lat.  $52^{\circ} 30'$ .

**HALF-BLOOD**, in law, is where a man marries a second wife, the first being dead, and by the first venter has a son, and by his second venter has likewise a son, the two brothers in this case are but of half-blood; they being issue by different venters; and on that account, lands in fee cannot descend from the one to the other; except in case of crown-lands, dignities, or estates-tail. But half-blood is no impediment to an administration, which may be granted to that as well as to the whole blood, of the effects of an intestate; and the half-blood shall come in for a share of his personal estate, equally with the whole blood, as the brothers by different venters are next of kin in equal degree. 22 Car. II. c. 10.

**HALF-MARK**, a noble or 6s. 8d.

**HALF-MOON**, in fortification, an outwork composed of two faces, forming a salient angle, whose gorge is in form of a crescent, or half-moon; whence the name.

We owe the invention of half-moons to the Dutch, who placed them before the points of bastions, which are now much better defended by counter-guards; the half-moons being placed before the curtains, which they defend to admiration.

There are two sorts of half-moons, one with, and the other without flanks. Those without flanks, which are most common, may be thus constructed: From F, (plate CXXV. fig. 1.) the angle of the flank, describe an arch, M A, with the radius FM, four or five toises longer than the part of the line of defence EF. The point A, where this arch intersects the line C A, which divides the curtain in

two equal parts, shall be the flanked angle of the half-moon; then the points, *b, b*, where the line of the counterscarpe intersects the line *A M*, will determine the length of its faces, *A b, A b*. Those with flanks are constructed much in the same manner; only that *D b*, from four to ten toises, is cut off of each demigorge, and the flanks *D G, E F*, are raised perpendicular to the curtain:

**HALL-SEAL**, that used in the court of chancery for sealing commissions to delegates, upon any appeal, in ecclesiastical or marine causes.

**HALL-TANGENTS**. See the articles **TANGENT** and **SCALE**.

**HALF-TONGUE**, *medietas linguæ*, among lawyers. See the article **MEDIETAS**.

**HALLÆTUS**, in ornithology, a name used by some for the bald buzzard. It is of the size of a large cock, and its head is white, whence it has got the epithet bald, because at a distance it appears as if there were no feathers on it.

**HALIOTIS**, the **EAR-SHELL**, in conchyliology, a simple shell without any hinge, and formed all of one piece, of a depressed figure, very patent at the mouth, having an approach to the spiral form at the summit, and having several perforations on the lateral part of the disk. It has got the name ear-shell from its figure. See **EAR** and **AURIS**.

**HALL**, in architecture, a large room at the entrance of a fine house and palace. Vitruvius mentions three kinds of halls; the tetrastyle, with four columns, supporting the platform, or ceiling; the corinthian, with columns all round let into the wall, and vaulted over; and the egyptian, which had a peristyle of isolated corinthian columns, bearing a second order with a ceiling.

The hall is properly the finest as well as first member of an apartment; and in the houses of ministers of state, magistrates, &c. is the place where they dispatch business, and give audience. In very magnificent buildings, where the hall is larger and loftier than ordinary, and placed in the middle of the house, it is called a saloon. See **APARTMENT**.

**HALL**, in old writers, is also used for a mansion-house; and to this day, in many parts of the kingdom, gentlemen's seats are called halls.

**HALL** is also a public building, or court of justice, as Westminster-hall, Guild-hall, a company's hall, &c.

In Westminster-hall are held the courts of King's bench, Common-pleas, Chancery, and exchequer. See the articles **KING'S BENCH**, **COMMON-PLEAS**, &c.

**HALL**, in geography, a town of Germany, in the circle of Austria, and county of Tyrol, situated six miles north-east of Inspruck: east long.  $11^{\circ} 28'$  north lat.  $47^{\circ} 15'$ .

**HALL** is also a town of the Austrian Netherlands in the province of Brabant, seven miles south of Brussels: east long.  $4^{\circ} 10'$ , north lat.  $50^{\circ} 50'$ .

**HALL** is also a city of Germany, in the circle of Upper Saxony, the capital of a dutchy situated on the river Sala, subject to the king of Prussia: east long.  $12^{\circ} 5'$  north lat.  $51^{\circ} 35'$ .

**HALL** is also a town of Germany, in the circle of Swabia, twenty miles east of Hailbron; being an imperial city, or sovereign state: east long.  $9^{\circ} 45'$ , north lat.  $49^{\circ} 20'$ .

**HALLAGE**, a fee or toll paid for cloth brought to be sold in Blackwell-hall, London.

**HALLAMAS**, the same with all-saints. See the article **ALL-SAINTS**.

**HALLATON**, a market-town, ten miles south-east of Leicester.

**HALLAND**, a subdivision of Gothland, in Sweden, at the entrance of the Baltic.

**HALLEIN**, a town of Bavaria, eight miles south of Salzburg.

**HALLELUJA**, a word signifying, praise the Lord.

The singing halleluja was a sort of invitational, or call to each other, to praise the Lord.

St. Austin says, that in some churches, it was sung only on Easter-day, and the fifty days of Pentecost; but that even in those churches where it was most in use, it was never used in the time of Lent. The fourth council of Toledo forbids the singing it, not only during Lent, but on all other days of fasting; and by the same council it is appointed to be sung after the reading of the gospel. It was also sung at funerals, as St. Jerom informs us in his epitaph of Fabiola, where he speaks of the whole multitude singing psalms together, and making the golden roof of the church shake with echoing hallelujas.

**HALLEN**, a town of the austrian Netherlands, in the province of Brabant: east long.  $5^{\circ}$ , north lat.  $50^{\circ} 55'$ .

**HALLEIN**, a town of Germany, in the archbishopric

Fig. 1. H A L F M O O N.

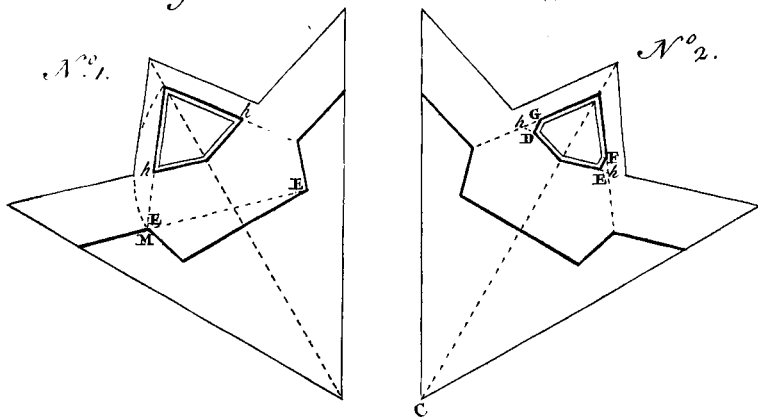
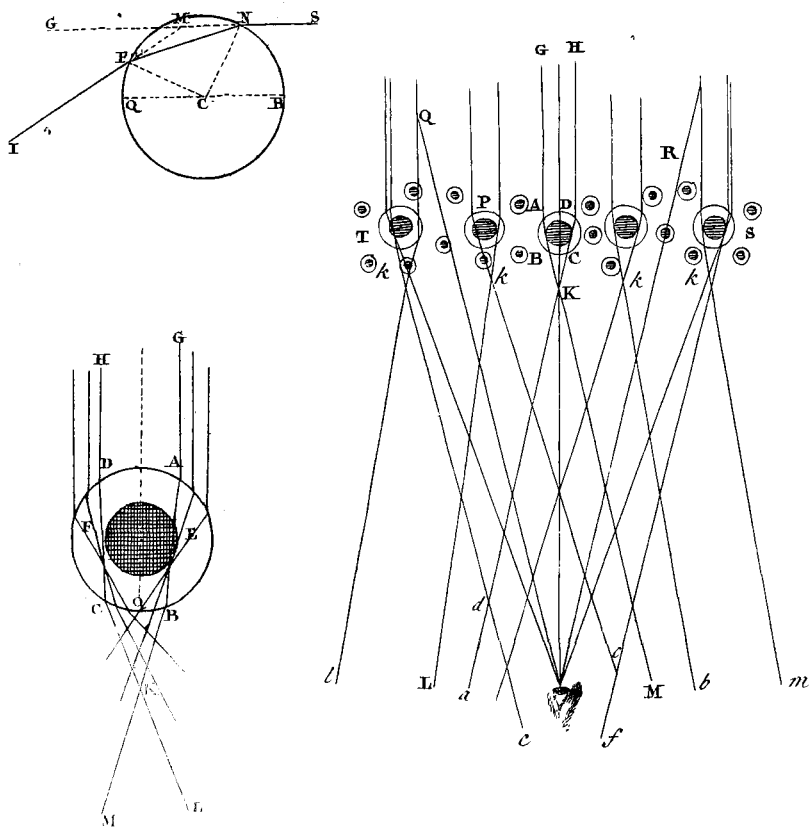


Fig. 2. H A L O.







archbishopric of Saltzburg: east long.

$13^{\circ} 6'$ , north lat.  $47^{\circ} 36'$ .

**HALLER**, a town in the Netherlands, in the province of Brabant: east long.  $5^{\circ}$ , north lat.  $50^{\circ} 40'$ .

**HALLERIA**, in botany, a genus of the *didymia-angiospermia* class of plants, the flower of which is monopetalous and ringent, with a quadrifid limb: the fruit is a berry, containing two cells, with a solitary seed.

**HALLIFAX**, a large market-town in the west riding of Yorkshire, thirty four miles south-west of York: west long.  $1^{\circ} 40'$ , north lat.  $53^{\circ} 45'$ .

**HALMSTAT**, a port-town of Gothland in Sweden, eighty miles south of Gottenberg: east longitude  $13^{\circ} 5'$ , north lat.  $56^{\circ} 45'$ .

**HALO**, in physiology, a meteor in the form of a luminous ring or circle, of various colours, appearing round the bodies of the sun, moon, or stars. See the articles **COLOUR**, **SUN**, &c.

Concerning the production of halos, Sir Isaac Newton intimates, that they are formed by the light which comes through the drops of rain, by two refractions, *viz.* at N and F (plate CXXV. fig. 2. n<sup>o</sup> 1.) without any reflection; but how this may be, is not easy to conceive.

A rainbow, or deeply coloured ring, as will be shewn under rainbow, might have been expected at the distance of about thirty-eight degrees from the sun; and also why it cannot happen. See **RAINBOW**.

For the same reason we should also not expect an halo to be formed by the same refracted rays, *viz.* on account of their not being refracted parallel to the eye, and consequently not entering it dense enough to render that part of the heaven more luminous than the rest; or to produce the lucid ring we call by this name. Again, Sir Isaac says, it ought to appear strongest at the distance of about twenty-six degrees from the sun, *viz.* when the angle  $IMG = 26^{\circ}$ , and to decay gradually both ways. But though that philosopher did not undoubtedly assert any thing without very great reason, yet this does not appear to us. For that the angle  $IMG$  may be twenty-six degrees, the angle of incidence  $BCN$  must be about forty-six; and then the angle of refraction  $CNF$  will be near thirty-three degrees: but why such an incidence and refraction should cause the rays to be refracted in greater plenty to the eye than any other, does not appear to me, says

Martin, nor can I find it by any experiment. On the contrary, as the angle  $IMG$  increases with the angle of incidence, and consequently with the angle of refraction, it is evident that with respect to heterogeneous light, the greater the angle  $IMG$  is, the more will it be refracted and scattered; and consequently the farther the drops are situated from the sun, the less dense will be the light transmitted by refraction to the eye, which therefore ought to decrease, as the distance of the sun increases. See **REFRACTION**.

As Sir Isaac Newton has said but little, so his expositors Dr. 'S Gravesande and Dr. Pemberton have thought fit to be absolutely silent on this head. Mr. Huygens has advanced an hypothesis by which the phenomenon may be solved, if we grant him the following postulatam, *viz.*

That there are certain globules in the atmosphere, consisting of a coat or shell of transparent ice or water, containing an opaque nucleus or kernel within; and that these are made from particles of snow, which is in itself opaque, attracting the aqueous particles in the vapour or exhalation by which it is sustained, which gathering together, form the semipellucid shell of water, or are frozen into a crystalline shell of ice; and this, he thinks, is proved to be matter of fact by the hailstones which fall to the earth: for these, says he, when broken, discover some snow at the center.

These things premised, he addresses himself to the solution, as follows. Let  $ABCD$  (*ibid.* n<sup>o</sup> 2.) represent such a globule with the opaque nucleus  $EF$  in the middle of it; and let us suppose the rays coming from  $G, H$ , to fall on the side  $AD$ . It is manifest they will be refracted inwards, from the surface  $AD$ ; from whence it follows that a great number of them must strike upon the kernel  $EF$ . Let  $GA$ , and  $HD$ , be the rays which, after refraction, touch the sides of the kernel  $EF$ , and let them be refracted again at  $B$  and  $C$ , emerging in the lines  $BK$ , and  $CK$ , crossing each other in the point  $K$ , whose distance from the globule is somewhat less than its semidiameter.

Wherefore, if  $EK$  and  $DK$  be produced towards  $M$  and  $L$ , it follows that no light coming from the sun through the globule, can proceed to the eye any where placed within the angle  $LKM$ , or rather in the cone which that represents; supposing that the obliquity of the incident rays  $HD$  and  $GA$  is such as shall

make the arch QC, and QB, the greatest possible: for then all the rays exterior to HD and GA, will be refracted nearer to Q, and after emergence cross each other in a point *k*, nearer the globule than the former; and therefore cannot come at the eye placed within the said cone LKM. Suppose now the eye placed at N, (*ibid.* n° 3.) and let NR, NQ, be drawn parallel to LK, and MK; then it is plain none of the globules, the same as ABCD, within the cone RNQ, can come to the eye at N. Thus the globules at O and P have their refracted rays *akb* and *ckd*, including the eye in the cone of obscurity. But other globules which lie without the cone QNR, as S and T, do not involve the eye N by their shadow-cones *lkc*, and *fmk*; and therefore some of those rays which are more refracted than *kc*, or *kf*, will fall upon the eye, and produce a luminous circular ring or corona, including a dark area within, and whose light outwardly decreases as it is more remote from the center.

**HALSFANG**, or **HEALSFANG**, in old writers, the same with pillory. See the article **PILLORY**.

Sometimes it signifies a mulct, paid to be exempted from that punishment.

**HALSTEAD**, a market-town of Essex, sixteen miles north of Chelmsford.

**HALTER**, in the manege, a headstall of hungary leather, mounted with one and sometimes two straps, with a second throat-band, if the horse is apt to unhalter himself.

**HALTER-CAST**, among farriers, an excoiation of the pastern occasioned by a horse's endeavouring to scrub the itching part of his body near the head and neck, when one of his hinder feet entangling in the halter, he sometimes receives very dangerous hurts in the hollow of his pastern by his struggling to disengage himself.

For the cure of this, take linseed-oil and brandy, of each an equal quantity; shake them together in a bottle till they are well mixt, and anoint the place morning and evening; having first clipt away the hair; but take care to keep the foot very clean.

**HALTERISTS**, *halteriste*, in antiquity, a sort of players at discus, so called from the greek *αλτηρ*; which is supposed to have been a leaden weight or ball, carried in each hand with a view to poise their bodies.

**HALTING**, among farriers, a limping or

going lame, an irregularity in the motion of an horse, arising from a lameness in the shoulder, leg, or foot, which makes him spare the part, or use it timorously.

Halting happens sometimes before, and sometimes behind; if it be before, the ailment must necessarily be either in the shoulder, knee, flank, pastern, or foot. If it be in the shoulder, it must be towards the withers, or in the pitch of the shoulder; and it may be known by his drawing one of his legs after him, and not fling it so nimbly as the other. If he cast it more outward than the other, it is a sign of lameness, and that the grief lies in the shoulder; and if you turn him short, on either hand, you will find that he will either favour that leg, or trip in turning. His lameness may also be seen by his standing in the stable, where he will hold the same leg more out than the other. If when you are upon his back, he complains more than he usually does, the grief certainly lies in the withers; so that on gripping him hard, you will perceive him to shrink, or perhaps offer to bite. If he treads thick and short before, then the grief is upon the pitch of the shoulder, close to the breast, which may be discovered by pressing the thumb hard against the place, on which he will shrink, and put back his leg, foot, and body. If the grief be in the elbow, it may be known by pinching him with the forefingers and the thumb, and then he will hold up his leg and offer to bite; but if the grief be in the knee, it may be discovered by the stiffness of his going; for he will not bend it so nimbly as he does the other. If it be in the flank or shinbone, the same may be seen or felt, it being a back sinew, splenter, strain, or the like. If it be in the bend of the knee, it is a malander, which is also easily discovered. Further, when the pastern or joint is affected, it may be known by his not bending it so well as the other, and by its being very hot. If it be in the foot, it must be either in the coronet or sole: if in the coronet, it probably came by some strain or wrench; if in the hoof, by some over-reach or distemper in or about the frush: if in the sole, from some prick, acclay, nail, &c.

**HALTWESEL**, a market-town of Northumberland, thirty-two miles west of Newcastle: west long. 2°, north lat. 55°.

**HALYMOTE**, in old law-books, signifies a holy or ecclesiastical court. See the article **COURT**.

**HALY**

**HALYWERC FOLK**, in old writers, were persons who enjoyed land, by the pious service of repairing some church, or defending a sepulchre.

This word also signified such persons in the diocese of Durham, as held their lands to defend the corps of St. Cuthbert, who from thence claimed the privilege of not being forced to go out of the bishopric.

**HAM**, in anatomy, the part behind the knee. See **KNEE** and **LEG**.

**HAM**, in old writers, a saxon word used for a home or dwelling-place, for a borough and a village, and also for a little narrow slip of meadow.

**HAMA**, in geography, a city of Germany, in the circle of Westphalia, and the capital of the county of Mark, subject to Prussia: east long.  $7^{\circ} 15'$ , north lat.  $51^{\circ} 35'$ .

**HAM**, in cookery, the leg and thigh of a hog seasoned and dried.

To salt a ham in imitation of those of Westphalia: let the ham be of young pork, sprinkle it with salt for one day, that it may fetch out the blood; then wipe it dry, and rub it with the following mixture: take a pound of brown sugar, a quarter of a pound of saltpetre, half a pint of bay-salt, and three pints of common salt; stir these together in an iron pan over the fire, till they are pretty hot, and then rub the leg of pork with it; let it lie three weeks in this salting, frequently turning it, and then dry it in a chimney.

**HAMA**, or **APAMEA**. See **APAMEA**.

**HAMADAN**, a city of Persia, in the province of Eyrac Agem, 200 miles north-west of Ispahan: east long.  $47^{\circ} 35'$ , north lat.  $35^{\circ}$ .

**HAMADRYADS**, in heathen theology, certain rural deities; being nymphs of the woods, whose fate depended on certain trees, together with which they were supposed both to be born and to die.

It was principally with oaks that these deities were thus united; and these nymphs were supposed to shew extraordinary gratitude to those who preserved them from death. As for those who destroyed the trees on which their life depended, they were sure to be punished for it in an exemplary manner.

It was easy for the Gentiles to fall into the opinion of these sort of divinities; for as they entertained a kind of religious veneration for such trees as were very old, and of an uncommon size, it was an easy transition to the belief, that they

were the abode and residence of some deity.

**HAMAMELIS**, in botany, a genus of the *tetrandria-digynia* class of plants, the corolla of which consists of four linear, equal, and very long petals: the fruit is a bivalve capsule, containing two cells: the seed is a single nucleus, of an oblong oval figure, and smooth surface.

**HAMAXOBIANS**, *hamaxobii*, an antient people of european Sarmatia, so called from their living together in chariots or waggons, for the convenience of shifting the place of their abode at pleasure.

**HAMBLING**, or **HAMELLING**, in the forest-law, is the ham-stringing of dogs, or cutting the great tendon called the ham-string.

**HAMBURG**, a large city and well fortified port-town of Germany, in the circle of lower Saxony, and dutchy of Holstein, situated on the north side of the river Elbe, partly on islands, and partly on the continent. It is an imperial city, or sovereign state, governed by its own magistrates, and subject only to the general laws of the empire. Merchants from all parts of Europe resort to it, from whence their goods are sent into the heart of the empire: east long.  $9^{\circ} 40'$ , north lat.  $54^{\circ}$ .

**HAMBURG-COMPANY** of merchants. See the article **COMPANY**.

**HAMCHEU**, the capital of the province of Chekiam, in China, situated on the river Cienton, 160 miles south-east of Nanking: east long.  $120^{\circ}$ , north lat.  $30^{\circ}$ .

**HAMELIN**, a town of Germany, in the circle of lower Saxony, and dutchy of Brunswick, subject to the elector of Hanover: east long.  $9^{\circ} 12'$ , north lat.  $52^{\circ} 15'$ .

**HAMELLING**, or **HAMBLING**. See the article **HAMELLING**.

**HAMIA**, or **AMIA**, in ichthyology. See the article **AMIA**.

**HAMILTON**, a town of Scotland, in the county of Clydesdale, situated on the river Clyde, eleven miles south-east of Glasgow: west long.  $3^{\circ} 50'$ , north lat.  $55^{\circ} 40'$ .

**HAMLE**, the name of the eleventh month of the ethiopian year, beginning on the 25th of June, old style.

**HAMLET**, **HAMEL**, or **HAMPEL**, is a small village, or part of a parish.

**HAMMER**, a well known tool used by mechanics, consisting of an iron-head, fixed cross-wise upon a handle of wood. There are several sorts of hammers used by black-smiths; as, 1. The hand-ham-

mer,

mer, which is of such weight that it may be wielded or governed with one hand at the anvil. 2. The up-hand sledge, used with both hands, and seldom lifted above the head. 3. The about-sledge, which is the biggest hammer of all, and held by both hands at the farthest end of the handle, and being swung at arms-length over the head, is made to fall upon the work with as heavy a blow as possible. There is also another hammer used by smiths, called a rivetting-hammer, which is the smallest of all, and is seldom used at the forge, unless upon small work. See Plate of Smithery.

Carpenters and joiners have likewise hammers accommodated to their several purposes. See Plate of Joinery.

**HAMMER**, *malleus*, in anatomy. See the articles **EAR** and **MALLEUS**.

**HAMMER** of a clock. See **CLOCK**.

*Coining with the HAMMER*. See the article **COINING**.

**HAMMOCK**, in a ship, a piece of canvas hung up fast by the four corners between decks, for seamen to sleep in.

**HAMMONT**, a town of Germany, in the circle of Westphalia, and bishopric of Liege, situated near the confines of Brabant: east long.  $5^{\circ} 32'$ , north latitude  $51^{\circ} 20'$ .

**HAMPER**, or **HANPER**, in chancery. See the article **HANPER**.

**HAMPSHIRE**, an english county, bounded by Berkshire, on the north; by Surrey and Sussex, on the east; by the english channel, on the south; and by Wiltshire and Dorsetshire, on the west. It comprehends the isle of Wight. Its chief towns are Winchester, Southampton, and Portsmouth.

*New* **HAMPSHIRE**, a province of New England, in north America, bounded by Nova Scotia, on the north; by the Atlantic ocean, on the east; by the province of Massachusetts-bay, on the south; and by New York, on the west: subject to Great Britain.

**HAMPSTEAD**, a pleasant village in Middlesex, four miles north of London.

**HAMSOKEN**, in old law-books, signifies the liberty or privilege a man enjoys in his own house. It is also said to signify a franchise granted to lords of manors, by which they hold pleas, and take cognisance of the breach of that immunity. In Scotland it is used for the crime of him that violently, and contrary to the peace, assaults a person in his own house.

**HAMPTON**, a market-town of Gloucestershire, twelve miles south of Gloucester: west long.  $2^{\circ} 15'$ , north lat.  $51^{\circ} 38'$ .

**HAMPTON**, is also a port-town of New Hampshire, forty miles north of Boston: west long.  $70^{\circ}$ , north lat.  $42^{\circ} 35'$ .

**HAMPTON-COURT**, a town in Middlesex, situated on the north side of the Thames, twelve miles west of London, and two west of Kingston; in which is the finest palace belonging to the king of England.

**HANAPER**, or **HANPER**, in chancery. See the article **HANPER**.

**HANAU**, the capital of a county of the same name in Germany, is pleasantly situated on the river Kunts, thirteen miles east of Francfort, and twelve north-west of Aschaffenburg: east long.  $8^{\circ} 45'$ , north lat.  $50^{\circ} 12'$ .

**HANCES**, in a ship, are falls or descents of the sife rails, which are placed from the stern down to the gang-ways.

**HAND**, *manus*, in anatomy, the extreme part of the arm. See the article **ARM**.

The bones of the hand are those of the carpus, metacarpus, and fingers, with the ossa sesamoidea. See **CARPUS**, &c.

The gibbous or convex part of the two first of these bones, constitutes the back of the hand; and the hollow part, the palm. Their bodies are placed distant from each other, and the interstices between them are filled up with the muscles called *musculi interossei*, serving to move the fingers.

As for the muscles of the hands, see the articles **FINGER**, **WRIST**, **METACARPUS**, &c.

The mechanism of the hand, is admirably contrived to answer the manifold uses and occasions wherein it is employed, being made up not only of nerves, muscles, &c. but a great number of little bones, all curiously jointed into each other; whence its extraordinary flexibility, which enables it to lay hold of adjacent bodies.

*Luxation of the HAND*, in surgery. The hand is said to be luxated forwards, or inwards, when it recedes from the muscles that bend the fingers; the luxation is said to be backward, when it departs from the muscles which extend the fingers; and when the carpus makes a tumour near the thumb, and a cavity near the little finger, the luxation is said to be outward.

To reduce luxations of the hand, it must be sufficiently extended by two assistants; one

one of whom is to lay hold of the hand, and the other of the humerus, pulling in opposite directions; then the part of the hand where the sinus is, must be placed on a flat table, that whatever sticks out may be depressed by the surgeon, and the hand reduced into its natural state.

**HAND**, in the manege, a measure of four inches, or of a clinched fist, by which the height of a horse is computed. Thus, a horse of war should be sixteen hands high.

Hand is also used for the division of a horse, into the fore and hind parts. The parts of the fore-hand, are the head, neck, and fore-quarters; and those of the hind-hand, include all the other parts of his body.

Hand is also used for the horseman's hand. Thus spear-hand, or sword-hand, is the horseman's right hand; and bridle-hand, is his left hand. And as the bridle hand gives motion to the bit, and serves to guide the horse more than the other helps, there are several expressions which relate to it. As, this horseman has no hand, that is, he makes use of the bridle unseasonably, and does not know how to give the helps of the hand with due nicety. To keep a horse upon the hand, is to feel him in the stay upon the hand, and to be prepared to avoid any surprisal or disappointment from the horse. A horse is said to lie or to rest upon the hand, that never refuses, but always obeys the hand. A good horseman ought to have a light hand; that is, he ought to feel the horse upon his hand, only that he may resist him when he attempts to slip from it; and instead of cleaving to the bridle, he should lower it, as soon as he has made his resistance: thus if a horse, through his eagerness to go forward, presses too much upon the hand, the rider ought, at certain times, to slack his hand, and at other times to keep a hard hand, that he may disappoint the horse, and prevent his pressing continually upon the bit; and this facility of slackening and stiffening the hand, is what is called a good hand. A horse is said to force the hand, when he does not fear the bridle, but runs away in spite of the horseman. To make a horse part from the hand, or to suffer him to slip from the hand, is to put on at full speed. To work a horse upon the hand, is to manage him by the effects of the bridle, without any other helps, except, upon occasion, those of the calves of the legs.

To make a horse right upon the hand, and free in the stay, he must be taught, by degrees, and by gentle methods, to know the hand; the horseman must turn him, or change hands, stop him, or manage with dexterity the pressure of his mouth, so as to make him suffer cheerfully and freely the effect of the bit, without resisting or resting heavy upon the hand.

**HAND-BARROW**, a wheel-barrow, which is of great use in fortification, for carrying earth from one place to another, and in a siege, for carrying bombs or cannon-balls along the trenches.

**HAND-BOROW**, in law-books, a surety, or manual pledge, of an inferior rank; as head-borow signifies a chief or superior.

**HAND-BREADTH**, a measure of three inches.

**HAND-CUFFS**, an instrument formed of two circular pieces of iron, each fixed on a hinge at the ends of a very short iron bar, which being locked over the wrists of a malefactor, prevents his using his hands.

**HAND-HABEND**, in law-books, a thief caught with the stolen goods about him.

**HAND-HOOK**, an instrument used by smiths to twist square iron.

**HAND-SCREW**, an instrument more usually called a jack. See the article **JACK**.

**HAND-SPIKES**, wooden levers used at sea to traverse the ordnance, or to turn the windlafs in weighing up the anchor, &c. They are more commodious than iron crows, because their length allows a better poize.

**Harmonical HAND**, in music, a name given to the antient diagram. See **DIAGRAM**. The reason of this appellation was, that Guido Aretine, upon inventing the notes *ut, re, mi, fa, sol, la*, disposed them on fingers, of the figure of a hand stretched out. See the article **NOTE**.

He thus changed the letters of the alphabet, which till that time used to express the notes, for these six syllables, taken out of the first strophe of the hymn of St. John the baptist, composed by Paulus Diaconus.

*Ut queant laxis re-sonare fibris  
Mi-ra gestorum fa-muli tuorum,  
Sol-ve polluti la-bii rectum,*

*Sancte Johannes.*

**Imposition of HANDS**, the ceremony of laying the hands on the head of a person to be ordained. See **ORDINATION**.

**HANDS**, in heraldry, are borne in coat-armour dexter and sinister, that is, right and

and left, expanded or open. These are the most necessary parts of the human body, as they serve to express all sorts of actions, and even our very thoughts and designs; thus joining of hands is an universal token of friendship, and clapping of hands a general mark of applause.

**HANDLING**, among cock-fighters, signifies the measuring the girth of a cock's body, by the hands.

**HANGINGS**, the linings of rooms, whether made of paper, arras, or the like.

**HANKWITE**, or **HANGWITE**, a fine imposed for hanging a felon or thief, without due course of law, or for suffering him to escape out of legal custody. Thus to be quit of hangwite, denotes a freedom from the penalty above-mentioned.

**HANOVER**, a city of Germany, in the circle of Lower Saxony, and dukedom of Brunswick, situated on the river Leina, thirty-six miles west of Brunswick: it is the capital of his britannic majesty's german dominions, situated in east long.  $9^{\circ} 45'$ , north lat.  $52^{\circ} 32'$ .

**HANPER**, **HANAPER**, or **HAMPER**, an office of the chancery, answering to the *fiscus* of the Romans.

*Clerk of the HANPER*, or **HAMPER**. See the article **CLERK**.

**HANSE**, or **HANS**, a company of merchants united for the promotion and advantage of trade.

**HANSE-TOWNS**, port-towns of Germany, of which Lubec and Hamburg were the chief. They were formerly all of them imperial cities, confederated for their mutual defence, and the protection of their trade.

**HAP**, in a legal sense, signifies to catch the rent, where partition is made between two parceners, and more land is allowed to one than the other, and she who has most of the land charges it to the other, who haps the rent, &c.

\* **HAPPINESS**, among philosophers, consists in the enjoyment not only of the goods of the body, as health, strength, neatness, decency, &c. but also of the more refined goods of the mind, as knowledge, memory, taste, and especially the moral virtues, magnanimity, fortitude, benevolence, &c.

Human happiness, in the present state of things, consists of many separate and little rivulets, which must often be left dry in the perpetual flux and reflux of human affairs; yet the main stream, with which these lesser ones generally communicate,

flows from within, from the heart of man; and, if this be sound and clear, happiness will roll on through life with a strong and equal current. Many of the inferior goods that enter the account of happiness, as health, fame, fortune, and the like, are often even after our utmost care unattainable, or at least precarious; it is therefore of the utmost consequence to be prepared against the want or loss of them, by having our desires moderated, and our passions under due command. And, let it be remembered, that it is not only of great importance to our ease and security against ill, but one of the highest improvements of virtue, to condemn what is thus unattainable and precarious, to condemn those things the contempt of which is truly great and heroic, and to place our happiness chiefly in those virtuous exercises and affections which arise from a pure and well disposed mind, an happiness which no condition in life can exclude, no change of fortune interrupt or destroy. This will arm and fortify the mind against those pains, which result to the generality of mankind, from the contrary evils.

Hence it is evident, 1. That the happiness of such a creature as man, can never be at a stand, or continue a fixed invariable thing. His finite nature, let it rise ever so high, admits still higher degrees in improvements and perfection. And his progression in improvement, or virtue, always makes way for a progression in happiness, so that no possible point can be assigned in any period of his existence in which he is perfectly happy; that is, so happy as to exclude higher degrees of happiness. All his perfection is only comparative. 2. It appears that many things must conspire to complete the happiness of so variable a creature as man, subject to so many wants, and susceptible of such different pleasures. 3. As his capacities of pleasure cannot be all gratified at the same time, and must often interfere with each other in such a precarious and fleeting state as human life, or be frequently disappointed, perfect happiness, *i. e.* the undisturbed enjoyment of the several pleasures of which we are capable, is unattainable in our present state. 4. That state is mostly to be sought after, in which the fewest competitions and disappointments can happen, which least of all impairs any sense of pleasure, and opens an unexhausted source of the most refined and lasting

lasting enjoyments. 5. That state which is attended with all those advantages, is a state or course of virtue. 6. Therefore, a state of virtue, in which the moral goods of the mind are attained, is the happiest state.

**HAQUEBUS**, the same with **harquebuss**. See the article **HARQUEBUSS**.

**HAQUENY**, or **HACKENY**. See the article **HACKENY**.

**HARANGUE**, a speech made by an orator in public.

It is frequently used for a too pompous and prolix declamation.

**HARBINGER**, an officer of the king's household, having four yeomen under him, who ride a day's journey before the court, when it travels, to provide lodgings, &c.

**HARBOROUGH**, a town of Leicester-shire, thirteen miles south-east of Leicester: west long.  $1^{\circ}$ , north lat.  $52^{\circ} 26'$ .

**HARBOUR**, a place where ships may ride safe at anchor, chiefly used in speaking of those secured by a boom and chain, and furnished with a mole. See the articles **BOOM**, **CHAIN**, and **MOLE**.

By many acts of parliament, persons casting and unlading ballast, rubbish, or the like, in any harbour or haven, forfeit  $5l$ .

**HARBOURING**, among sportsmen, is said of a hart that goes to rest: hence to unharm a deer, is to dislodge him.

**HARBURGH**, a port-town of Germany, in the circle of Lower Saxony, and dutchy of Lunenburg, situated on the river Elbe, opposite to Hamburg: east long.  $9^{\circ} 30'$ , north lat.  $53^{\circ} 57'$ .

**HARCOURT**, a town of France, in the province of Normandy, twenty-three miles south-west of Rouen.

**HARDENING**, the giving a greater degree of hardness to bodies than they had before. See the article **HARDNESS**.

There are several ways of hardening iron and steel, as by hammering them, quenching them, when hot, in cold water, case-hardening, &c.

To harden english and swedish steel, being heated pretty hot, it is suddenly plunged in water; but spanish and venice steel requires only a blood-red heat, before it is quenched in the water: sometimes the steel is rubbed with a woollen rag, dipt in a mixture of powdered indigo and fallad-oil, while it is heating, and afterwards let cool of itself.

**Case-HARDENING** is performed after the following manner: take cow-horn or

hoof, dry it well in an oven; pound it to powder; put as much bay-salt as o this powder into stale urine, or white-wine vinegar, and mix them well together; then cover the iron or steel with this mixture, and wrap it up in loam or plate-iron, so that the mixture may touch every part of the work; then put it into the fire, and blow the coals till the whole lump has a blood-red heat, but no higher, and then take it out and quench it.

**HARDERWICK**, a town of Guelderland, in the United Netherlands, twenty-three miles north-west of Zutphen: east long.  $5^{\circ} 30'$ , north lat.  $52^{\circ} 35'$ .

**HARDNESS**, in physiology, that quality in bodies whereby their parts cohere firmly together, so as not to give way to any external impulse, nor yield inwards, without breaking.

In this sense hardness coincides with what on other occasions we call firmness, in opposition to softness and fluidity. See **SOFTNESS** and **FLUIDS**.

From that species of attraction called cohesion, it is easy to account for the different degrees of hardness in bodies: those whose constituent particles are flat or square, and so situated as to touch in many points, will be hard; those particles which are more round, and touch in fewer points, will constitute a softer body; those which are spherical, or nearly of that figure, will form a fluid. See the articles **ATTRACTION** and **COHESION**. But nothing can conduce more to explain the nature of this doctrine, than the following passage of Sir Isaac Newton.

“ The parts of all homogeneous bodies, says he, which fully touch one another, stick together very strongly. And for explaining how this may be, some have invented hooked atoms, which is begging the question; and others tell us, that bodies are glued together by rest, that is by an occult quality, or rather by nothing; and others, that they stick together by conspiring motions, that is, by relative rest among themselves. I had rather infer from their cohesion, that their particles attract one another by some force, which, in immediate contact, is exceeding strong; at small distances, performs many chemical operations, and reaches not far from the particles with any sensible effect. All bodies seem to be composed of hard particles: even the rays of light seem to be hard bodies; and therefore hardness may be reckoned the property of all uncompounded matter:

for all bodies, so far as experience reaches, are either hard, or may be hardened. Now if compound bodies are so hard, as we find some of them to be, and yet are very porous, and consist of parts which are only laid together, the simple particles which are void of pores, and were never yet divided, must be much harder. For such hard particles being heaped up together, can scarce ever touch one another in more than a few points, and therefore must be separable by a much less force than is requisite to break a solid particle where parts touch in all the space between them, without any pores or interstices to weaken their cohesion. And how such very hard particles, which are only laid together, and touch only in a few points, can stick together, and that so firmly as they do, without the assistance of something which causes them, to be attracted, or pressed towards one another, is very difficult to conceive."

There are several ways, says Mr. Boyle, whereby a body may be put into a texture proper to make it hard, though for the most part one of them is not employed apart, but two or more in conjunction. The first and chiefest of these seem to be the fitness and shapes of the component particles to fasten them to each other, as if some were figured like the handles of buckets, and others like the hooks employed to draw them; some like buttons, others like loops; some like male, others like female screws; or as if many together were so variously branched, that their parts may be interwoven one with another, and not prove easily separable; thus only, by twisting threads together, they are so well fastened to one another as to constitute a cable, which is not to be broken without a vast force. See the article *ATOM*.

And so numerous may be the correspondent figures fit to fasten bodies to one another, that it is very possible for two fluids, upon their conjunction, to intangle their parts, and thereby acquire such a new texture, that they cannot dissociate themselves, nor flow after the manner of liquors, but remain connected and unactive, as to become one intire hard body. See the article *FREEZING*.

**HARDS**, or **HURDS**, the coarser part of hemp or flax, separated from the fine. See the articles *HEMP* and *FLAX*.

**HARDY-SHREW**, in zoology. See the article *SHREW*.

**HARDY-SHRUBS**, among gardeners. See the article *SHRUB*.

**HARE**, in zoology, an animal of the *lepus*-kind, distinguished by its abrupt tail, and black eyes. It greatly resembles the rabbit, but is larger, and somewhat longer, in proportion to its thickness; and its ears are remarkably long, being always in a position to receive the least sound, and moveable with surprising ease. See plate *CXXVII*. fig. 1.

The hare is a beast of venery, or of the forest, but peculiarly so termed in the second year of her age. There are reckoned four sorts of them, from the place of their abode: some live in the mountains, some in the fields, some in marshes, and some wander about every where. The mountain-hares are the swiftest, the field-hares are not so nimble, and those of the marshes are the slowest; but the wandering hares are the most dangerous to follow, for they are cunning in the ways and mazes of the fields, and knowing the nearest ways, run up the hills and rocks, to the confusion of the dogs, and the discouragement of the hunters. See the article *HUNTING*.

**HARE-LIP**, *labium leporinum*, in surgery. See the article *LIP*.

**HARE'S EARS**, *bupleurum*, in botany. See the article *BUPLEURUM*.

**HARE'S LETTUCE**, a name sometimes given to the sonchus, or sow-thistle.

**HARE-STRONG**, the same with *peucedanum*, or hog's fennel.

**HARENGUS**, the herring. See the article *HERRING*.

**HARFLEUR**, a port-town of France, in the province of Normandy, situated near the mouth of the Seyne, four miles west of Havre de Grace: east long. 15°, north lat. 49° 36'.

**HARIOT**, or **HERIOT**, in law, a due belonging to a lord at the death of his tenant, consisting of the best beast, either horse, ox, or cow, which he had at the time of his death; and in some manors, the best goods, piece of plate, &c. are called harlots.

There is both hariot-service, and hariot-custom: when a tenant holds by service to pay a hariot at his decease, which is expressly reserved in the deed of feoffment, this is hariot-service; and where harlots have been customarily paid time out of mind, after the death of a tenant for life, this is termed hariot-custom. For hariot-service, the lord may distrain any beast belonging to the tenant, that is on the land. For hariot-custom, the lord is to seize and not distrain; but he may seize the



the best beast that belonged to the tenant, tho' it be out of the manor, or in the king's highway, because he claims it as his proper goods by the death of his tenant. Nevertheless, where a woman marries and dies, the lord shall have no harriot-custum, because a feme-covert has no goods to pay as a harriot.

**HARLE**, in ornithology, the name by which the merganser is called in several parts of the kingdom. See **MERGANSER**.

**HARLEBECK**, a town of the austrian Netherlands, in the province of Flanders, situated on the river Lys six miles north-east of Courtray : east long.  $3^{\circ} 15'$ , north lat.  $50^{\circ} 50'$ .

**HARLEQUIN**, a buffoon or merry-andrew; but is now used for a person of extraordinary agility, dressed in party-coloured cloaths, the principal character in a pantomime entertainment. See the article **PANTOMIME**.

**HARLESTON**, a market-town of Norfolk, situated on the river Waveney, fourteen miles south of Norwich : east long.  $1^{\circ} 25'$ , north lat.  $52^{\circ} 35'$ .

**HARLINGEN**, a port town of the United Netherlands, in the province of west Friesland, situated on the German sea : east long.  $5^{\circ} 20'$ , north lat.  $53^{\circ} 15'$ .

**HARLOT**, a whore, or one that prostitutes her body for hire. These are liable to be committed to prison, and kept to hard labour. For the punishment of those who keep and entertain them, see the article **BAWDY-HOUSE**.

**HARLOW**, a market-town of Essex, situated fifteen miles west of Chelmsford : east long.  $6'$ , north lat.  $51^{\circ} 45'$ .

**HARMALA**, in botany, a plant otherwise called peganum. See **PEGANUM**.

**HARMONIA**, **HARMONY**, in music. See the article **HARMONY**.

**HARMONIA**, in anatomy, a species of articulation, being a kind of symphysis intended for absolute rest. See the article **ARTICULATION**.

**HARMONICA**, **HARMONICS**, among musicians. See the article **HARMONICS**.

**HARMONICAL**, something belonging to harmony. See the article **HARMONY**.

**HARMONICAL ARITHMETIC**, that part of arithmetic which considers musical intervals, expressed by numbers, in order to our finding their mutual relations, compositions, and resolutions.

**HARMONICAL COMPOSITION**, in a general sense, includes both harmony and melody, *i. e.* of music or songs, both in a single part, and in several parts.

In its more proper and limited sense, harmonical composition is restrained to that of harmony; and may be defined the art of disposing and concerting several single parts together, so as to make one agreeable whole. See **HARMONY**, **COMPOSITION**, and **COUNTER-POINT**.

**HARMONICAL DIVISION**, in music. See the article **DIVISION**.

**HARMONICAL INTERVAL**, in music, denotes the difference of two sounds, which is agreeable to the ear, whether a consonance or succession; and are, therefore, the same with concord. See the articles **CONCORD** and **INTERVAL**.

**HARMONICAL PROPORTION**. See the article **PROPORTION**.

**HARMONICAL SERIES**, a series of many numbers in continual harmonical proportion. Thus if there are four or more numbers, of which every three immediate terms are harmonical, the whole will make an harmonical series: such is  $30 : 20 : 15 : 12 : 10$ . Or, if every four terms immediately next each other are harmonical, it is also a continual harmonical series, but of another species, as  $3, 4, 6, 9, 18, 36, \&c.$

**HARMONICAL SOUNDS**, an appellation given, by Mr. Sauveur, to such sounds as always make a determinate number of vibrations, in the time that one of the fundamentals, to which they are referred, makes one vibration.

Harmonical sounds are produced by the parts of chords, *&c.* which vibrate a certain number of times, while the whole chord vibrates once.

The relations of sounds had only been considered in the series of numbers,  $1 : 2, 2 : 3, 3 : 4, 4 : 5, \&c.$  which produced the intervals called octave, fifth, fourth, third, *&c.* Mr. Sauveur first considered them in the natural series,  $1, 2, 3, 4, 5, \&c.$  and examined the relations of sounds arising therefrom. The result is, that the first interval,  $1 : 2$ , is an octave; the second,  $1 : 3$ , a twelfth; the third,  $1 : 4$ , a fifteenth, or double octave; the fourth,  $1 : 5$ , a seventeenth; the fifth,  $1 : 6$ , a nineteenth, *&c.*

This new consideration of the relations of sounds, is more natural than the old one; and is, in effect, all the music that nature makes without the assistance of art. See the articles **CHORD**, **VIBRATION**, **ORGAN**, *&c.*

**HARMONICS**, *harmonica*, that part of music which considered the differences and proportions of sounds, with respect to

acute and grave; in contradistinction to rhythmica and metrica.

The harmonics is the only part of the ancient music whereof we have any tolerable account. According to Mr. Malcolm, the doctrine of harmonics was reduced into seven parts, *viz.* of sounds, of intervals, of systems, of the genera, of the tones or modes, of mutation, and of the melopoia. See the articles SOUND, INTERVAL, &c.

**HARMONY**, *ἁρμονία*, in music, the agreeable result, or union, of several musical sounds, heard at one and the same time; or the mixture of divers sounds, which together have an effect agreeable to the ear. See the article SOUND.

As a continued succession of musical sounds produces melody, so does a continued combination of these produce harmony. See the article MELODY.

Among the antients, however, as also sometimes among the moderns, harmony is used in the strict sense of consonance, and is equivalent to symphony; and concord and harmony do in reality signify the same thing, though custom has made a little difference between them. See the articles SYMPHONY, &c.

The antients, says Mr. Malcolm, seem to have been entirely unacquainted with harmony, the soul of modern music: in all their explications of the melopoia, they say not a word of concert, or the harmony of parts. We have instances, indeed, continues that author, of their joining several voices or instruments in consonance; but then these voices and instruments are not so joined as that each had a distinct and proper melody, and so made a succession of various concords; but were either unisons or octaves in every note; and so all performed the same individual melody, and so constituted one song. See the article SYNAULIA.

When the parts differ not in the tension of the whole, but in the different relations of the successive notes, it is this that constitutes the modern art of harmony. See MUSIC and MELOPOIA.

To understand the nature, and determine the number and preference of harmonies, it is to be considered, that in every compound sound, where there are not more than three simple ones, there are three kinds of relations, *viz.* primary relation of every simple sound to the fundamental or gravest, whereby they make different degrees of concord with it; the mutual relations of the acute sounds each

with the other, whereby they mix concord or discord into the compound; and the secondary relation of the whole, whereby all the terms unite their vibrations, and coincide more or less frequently.

Suppose four sounds A, B, C, D, whereof A is the gravest, B the next, then C, and D the acutest. Here A is the fundamental, and the relations of B, C, and D are primary relations: so if B be a third greater above A, that primary relation is 4 to 5; and if C be a fifth to A, that primary relation is 2 to 3; and if D be an octave to A, that is 1 to 2. For the mutual relations of the acute terms B, C, D, they are had by taking their primary relations to the fundamental, and subtracting each lesser from each greater: thus B to C is 5 to 6, a third lesser; B to D, 5 to 8, a sixth lesser, &c. Lastly, to find the secondary relation of the whole, seek the least common dividend to all the lesser terms or numbers of the primary relations, *i. e.* the least number that will be divided by each of them exactly, this is the thing sought, and shews that all the simple sounds coincide after so many vibrations of the fundamental as the number expresses.

So in the preceding example, the lesser terms of the three primary relations are 4, 2, 1, whose least common dividend is 4, consequently at every fourth vibration of the fundamental, the whole will coincide.

The proper ingredients of harmony are concords; and all discords, at least in the primary and mutual relations, are absolutely forbidden. It is true, discords are used in music, but not of themselves simply, but only to set off the concords by their contrast and opposition. Hence, any number of concords being proposed to stand in primary relations with a common fundamental, we discover whether or no they constitute perfect harmony, by finding their mutual relations: thus, suppose the following concords or primary relations, *viz.* the greater third, fifth, and octave given, their mutual relations are all concord, and therefore may stand in harmony; for the greater third and fifth are to one another as 5 to 6, a lesser third; the greater third and octave, as 5 to 8, a lesser sixth; and the fifth and octave, as 3 to 4, a fourth. But if fourth, fifth, and octave be proposed, it is evident they cannot stand in harmony, by reason between the fourth and fifth there is a discord, *viz.* the ratio 8 to 9.

Again,

Again, supposing any number of sounds which are concord each to the next, from the lowest to the highest; to know if they can stand in harmony, we must find the primary and all the mutual relations, which must be all concord: thus the following ones cannot, *viz.* 4, 6, 9, by reason 4 to 9 is a discord.

The perfection of harmonies depends on all the three relations, it is not the best primary relation that makes the best harmony; for then a fourth and a fifth must be better than a fourth and a sixth; whereas the first two cannot stand together, because of the discord of the mutual relation. Nor does the best secondary relation carry it; for then would a fourth and a fifth, whose secondary relation, with one common fundamental, is 6, be better than a third and fifth, whose secondary relation is 10: but here also the preference is due to the better mutual relations. Indeed, the mutual relations depend on the primary, though not so as that the best primary shall always produce the best mutual relations. However, the primary rela-

tions are of the most importance; and, together with the secondary, afford us the following rule for determining the preference of harmonies, *viz.* comparing two harmonies together that have an equal number of terms, that which has the best primary and secondary relations, is the most perfect. But in cases where the advantage lies in the primary relation of the one, and in the secondary of the other, we have no certain rule; the primary are certainly the most considerable, but how the advantage in these ought to be proportioned to the disadvantage of the other, or *vice versa*, we know not; so that a well-tuned ear must be the last resort in these cases.

Harmony is divided into simple and compound.

*Simple HARMONY* is that in which there is no concord to the fundamental above an octave. The ingredients of simple harmony are the seven original simple concords, of which there can be but eighteen different combinations that are harmony, which are given in the following table from Mr. Malcolm.

T A B L E of SIMPLE HARMONIES.

Secondary Relations.				Secondary Relations.			
Fifth	octave	2	third greater	fifth	4	third greater	fifth
Fourth	octave	3	third less	fifth	10	third less	fifth
Sixth greater	octave	3	fourth	sixth greater	3	fourth	sixth greater
Third greater	octave	4	third greater	sixth greater	12	third greater	sixth greater
Third less	octave	5	third less	sixth less	5	third less	sixth less
Sixth less	octave	5	fourth	sixth less	15	fourth	sixth less

These are all the possible combinations of the concords, that are harmony; for the octave is compounded of a fifth and a fourth, or a sixth and a third, which have the variety of greater and lesser: out of these are the first six harmonies composed. Then the fifth being composed of a greater and a lesser third, and the sixth of a fourth and third; from these proceed the next six harmonies of the table: then an octave joined to each of these six, make the last six of the table.

The perfection of the first twelve is, according to the order of the table; of the first six each has an octave; and their preference is according to the perfection of that other lesser concord joined to the octave. For the next six, the preference is given to the two combinations with the fifth, whereof that which has the third greater is the best. For the last six, they are not placed last, because the least perfect,

but because they are the most complex, and are the mixtures of the other twelve with each other: in point of perfection, they are plainly preferable to the preceding six, as having the same ingredients with an octave more.

*Compound HARMONY* is that which to the harmony of one octave, adds that of another. For the compound harmonies, their varieties are easily found out of the combinations of the simple harmonies of several octaves.

Harmony may also be divided into that of concords and that of discords. The first is that which we have hitherto considered, wherein nothing but concords are admitted: the second is that wherein discords are used, and mixed with concords. See the articles CONCORD and DISCORD.

*Composition of HARMONY.* See the article COMPOSITION.

HARMONY

**HARMONY** is also sometimes used to denote an agreement, suitableness, union; conformity, &c. thus, in music, we sometimes apply it to a single voice, when sonorous, clear, and soft; to a single instrument, when it yields a very agreeable sound: in matters of literature, we use it for a certain agreement between the several parts of the discourse: in architecture, harmony denotes an agreeable relation between the parts of a building: in painting, they speak of an harmony both in the ordonnance and composition, and in the colours of a picture; in the ordonnance it signifies the union or connection between the figures, with respect to the subject of the piece; in the colours, it denotes the union or agreeable mixture of different colours. See **SYMMETRY**, **COLOURING**, &c.

**HARMONY** of the *spheres*, or *Celestial HARMONY*, a sort of music much talked of by many of the antient philosophers and fathers, supposed to be produced by the sweetly tuned motions of the stars and planets. This harmony they attributed to the various proportionate impressions of the heavenly globes upon one another, acting at proper intervals. It is impossible, according to them, that such prodigious large bodies, moving with so much rapidity, should be silent; on the contrary, the atmosphere continually impelled by them, must yield a set of sounds proportionate to the impression it receives; consequently as they do not all run the same circuit, nor with one and the same velocity, the different tones arising from the diversity of motions, directed by the hand of the Almighty, must form an admirable symphony, or concert.

They therefore supposed, that the moon, as being the lowest of the planets, corresponded to *mi*; mercury, to *fa*; venus, to *sol*; the sun, to *la*; mars, to *si*; jupiter, to *ut*; saturn, to *re*; and the orb of the fixed stars, as being the highest of all, to *mi*, or the octave.

*Pre-established HARMONY*, a celebrated system of M. Leibnitz, by means whereof he accounts for the union or communication between soul and body. The philosophers had universally held, that the soul and the body act physically on each other. Des Cartes first shewed that the heterogeneity of their natures did not allow of such real union; and that they could only have an apparent one, whereof God is the mediator. Mr. Leibnitz, unsatisfied with either of these hypotheses, establishes a third: a

soul or spirit, he observes, is to have a certain series of thoughts, desires, and wills; a body, which is only a machine, is to have a certain series of motions, to be determined by the combination of its mechanical disposition, with the impressions of external objects.

If now there be found a soul and a body so framed, that the whole series of wills of the soul, and the whole series of motions of the body, exactly correspond; and at the same time, for instance, when the soul desires to go to any place, the two feet move mechanically that way; this soul and body will have a relation to one another; not by any actual union between them, but by the constant and perpetual correspondence of the several actions of both. Now God puts together this soul and body, which had such a correspondence antecedent to their union. And the same is to be understood of all the other souls and bodies, that have been or ever will be joined.

In effect the laws of motion in the body, succeeding in the order of efficient causes, do all agree and correspond with the ideas of the soul; so that the body is determined to act at the time when the soul wills. The same principle he extends further, and makes a pre-established harmony between the kingdoms of nature and grace, to account for the apparent communication between them, and makes physical and moral evil correspond. For a farther account of his manner of reasoning upon this doctrine, we refer the reader to his *Essais de Theodicée*.

**HARMOSTES**, in grecian antiquity, an appellation given to several magistrates among the Spartans, whose business was to look to the building of citadels, the reparation of forts and fortifications, and the like.

**HARNESS**, the furniture put upon a horse to draw in a coach, or other wheel-carriage.

**HARNESS-GALLS**, swellings or soreness on the breasts of coach-horses, occasioned by the galling of the harness, especially in rainy weather.

To cure this, first shave off the hair about the sore very close, and rub the whole breast with a lather of water and black-soap; then wash that part of the breast which is usually covered with the petrel, with salt-water, suffering it to dry of itself. If the hardness of any part of the harness occasions the galling, take it away, or cover it with little bolsters.

**HARO**,

**HARO**, or **HAROL**, *clamor de haro*, in our old customs, an out-cry after felons, the original of which came from the Normans. See the article **HUE** and **CRY**.

**HARP**, a musical instrument of the string-kind, of a triangular figure, held upright between the legs of the person who plays upon it.

There is some diversity in the structure of harps. That called the triple harp, has three rows of strings or chords, which in all make seventy-eight, or four octaves; the second row makes the half-turn, and the third is unison with the first. There are two rows of pins on the right side, called buttons, that serve to keep the strings tight in their holes, which is fastened at the other end to three rows of pins on the upper side, called the keys. This instrument is struck with the fingers and thumbs of both hands: its music is like that of the spinet, all its strings going by semi-tones; whence some have called it the inverted spinet. There are among us two sorts of this instrument, *viz.* the Irish harp, which is strung with wire; and the Welch harp, strung with gut.

King David is usually painted with a harp in his hands; but we have no testimony in all antiquity, that the Hebrew harp was any thing like ours: on a Jewish medal of Simon Macchabæus, we see two sorts of musical instruments, but they are both of them different from our harp, having only three or four strings. The harp in use among the ancient Jews, is supposed to be more like a lute, or a guitar, than the instrument above described, which it is thought was invented either by the Cimbri, or the Anglo-faxons.

**Bell-HARP**, a musical instrument of the string-kind, thus called from the common players upon it, swinging it about as a bell on its bias.

It is about three feet long; its strings, which are of no determinate number, are of brass or steel-wire, fixed at one end, and stretched a-cross the sound-board, by screws fixed at the other end. It takes in four octaves, according to the number of the strings, which are struck only with the thumbs, the right hand playing the treble, and the left the base; and in order to draw the sound the clearer, the thumbs are armed with a little wire-pin. This may perhaps be the *lyra* or *cythara* of the ancients; but we find no mention of it under the name it now

bears, which must be allowed to be modern.

**HARPEGGIATO**, or **HARPEGGIO**, in music, is to cause the several sounds of one accord to be heard distinctly one after the other, beginning with either at pleasure, but commonly with the lowest.

**HARPIES**, *harpyiæ*, *ἀρπυιαι*, among the ancient poets, fabulous impure monsters, said to be the daughters of Neptune and Earth. Virgil mentions three of them, Aello, Ocypete, and Celeno; they are described to be fowls with the face of a virgin, bear's ears, their bodies like vultures, and hands like their crooked talons. Virg. *Æn.* III.

**HARPINEER**, or **HARPONEER**, the person who manages the harping-iron. See the next article.

**HARPING-IRON**, or **HARPOON**, a large spear or javelin, made of forged iron, and five or six feet long; it is fastened to a line, and used in the whale-fishery. See the article **FISHERY**.

**HARPINGS**, in a ship, properly denote her breadth at the bow. Some also give the same name to the ends of the bends that are fastened into the stern.

**HARPSICHORD**, the most harmonious of all the musical instruments of the string-kind. It is played on after the manner of the organ, and is furnished with a set and sometimes with two sets of keys; the touching or striking of these keys, move a kind of little jacks, which also move a double row of chords or strings, of brass or iron, stretched over four bridges on the table of the instrument.

**HARQUEBUSS**, a piece of fire arms, of the length of a musket, usually cocked with a wheel. It carried a ball that weighed one ounce seven eighths.

There was also a larger sort, called the great harquebuss, used for the defence of strong places, which carried a ball of about three ounces and a half; but they are now but little used, except in some old castles, and by the French in some of their garriçons.

**HARRIER**, a kind of hound, endowed with an admirable gift of smelling, and very bold in the pursuit of his game. There are several kinds of harriers; some being for the hare, the fox, the wolf, hart, weasel, badger, &c.

**HARROW**, in agriculture, an instrument used by husbandmen, to break the clods of earth, and to draw the ground over the seed when sown. It is a sort of wooden drag, made in form of a square, with large

large iron-teeth, or tines, not unlike those of a herse. See HERSE.

**HART**, a stag, or male deer, in the sixth year. See STAG and CERVUS.

**HART-ROYAL**, one that has been hunted by the king or queen, and escaped with life; in which case proclamation is usually made, that none kill or offend him, as being a hart-royal proclaimed.

**HART-HUNTING**. See HUNTING.

**HART'S HORNS**, *cornua cervi*, in pharmacy, the whole horns of the common male deer, as separated from the head, without farther preparation.

The chemical analysis of hart's horn is sufficiently known: it yields a water highly impregnated with a volatile salt, which is called spirit of hart's horn, with a fetid oil, and a volatile salt by the common distillation in a retort. The remainder in the bottom of the retort, after the distillation is finished, is black; but on being calcined in an open fire, it becomes white and friable, and is what is kept in the shops under the name of burnt hart's horn. Beside these preparations, we use the thin shavings of the horns, which, on long boiling in water, become a jelly: this jelly is nutritive and strengthening; it is sometimes given in diarrhoeas; but a decoction of burnt hart's horn in water, is more frequently used for this purpose, and is what is called hart's horn drink.

The salt of hart's horn is a great sudorific, and is given in fevers of many kinds with great success; the spirit has the same and all the other virtues of volatile alkalis, and is used to bring people out of faintings by its pungency, on holding it under their nose, and at the same time pouring some drops of it in water down the person's throat.

**HART'S HORN**, in botany, a name given by some writers to coronopus. See the article CORONOPUS.

**HART-WORT**, *tordyllum*, in botany. See the article TORDYLLIUM.

**Ethiopian HART-WORT**, a plant more usually called peucedanum, or hog's fennel.

**HARTFORD**, the capital of Hartfordshire, situated twenty-one miles north of London: west longit. 7°, and north lat. 51° 45'.

**HARTFORD** is also a town of New England, in the province of Connecticut, situated fifty miles west of Boston: west lon. 71° 15', and north lat. 42°.

**HARTLAND**, a market-town of Devon,

situated near the Bristol-channel; it gives name to a cape, called Hartland-point, at the entrance of the Bristol-channel: west lon. 4° 45', and north lat. 51° 9'.

**HARTLEPOOL**, a port-town of the county of Durham, situated on the German ocean, fourteen miles south-east of Durham: west longit. 55', and north lat. 54° 40'.

**HARVEST**, the time or season that the corn is ripe, and fit to be reaped and taken into barns.

**HARVEST-FLY**, in zoology, a large four-winged fly, of the cicada-kind, very common in Italy, and erroneously supposed to be a grasshopper. See the article CICADA.

**HARUSPEX**, or **ARUSPEX**, in roman antiquity. See ARUSPICES.

**HARWICH**, a borough and port-town of Essex, sixty-two miles north-east of London: east lon. 1° 25', north lat. 52° 5'. It sends two members to parliament.

**HASEL**, or **HAZLE**. See HAZLE.

**HASLEM**, an island of Denmark, in the Categate-sea, north of the island of Zealand.

**HASLEMERE**, a borough-town of Surry, thirty-eight miles south-west of London, and ten miles south-west of Guildford.

It sends two members to parliament.

**HASELT**, a town of Westphalia, in Germany, fifteen miles north-west of Maafricht.

**HASSIDEANS**, or **ASSIDEANS**, an appellation given to those Jews who resorted to Mattathias, to fight for the law of God, and the liberties of their country.

**HASSOCK**, a bask made of rushes, to kneel or rest the feet upon in churches.

**HASTA**, among medallists, a kind of javelin, not shod or headed with iron; or rather an antient sort of scepter, longer than ordinary, occasionally given to all the gods.

**HASTATED LEAF**, among botanists, one resembling the head of an halbert. See plate CXXVII. fig. 4.

**HASTINGS**, a borough-town of Suffex, situated on the coast of the English channel, fifty miles south-east of London: east lon. 36', and north lat. 50° 50'.

**HAT**, a covering for the head, worn by the men in most parts of Europe. Those most in esteem are made of the pure hair of the castor or beaver; for they are also made of the hair or wool of divers other animals, and that by much the same process.

*Method of making HATS.* To make the beaver-hats, they tear off the long and short hair from the skin, with knives suitable to the occasion. After which they proportion the quantity of the several sorts of beaver-hair, by mixing one third of the dry castor to two thirds of old-coat, which is a term for a skin that has been worn some time by the Indians of America, who catch and sell them to the Europeans. The hair, so mixed, is carded and weighed out into parcels, according to the size and thickness of the hat intended. The stuff is now laid on the hurdle, with an instrument called a bow, resembling that of a violin, but larger; whose string being worked with a small bow-stick, and made to play on the furs, they fly, and mix themselves together, the dust and filth at the same time passing through the chinks. Instead of a bow, some hat-makers use a sence of hair, through which they pass the stuff. Thus hats are formed of an oval figure, ending with an acute angle at the top: with what stuff remains they strengthen them where slenderest, yet designedly make them thicker in the brim near the crown, than towards the circumference, or in the crown itself. They next harden the stuff, so managed, into more compact flakes, by pressing down a hardened leather upon it. This done, they are carried to the bason, upon which laying one of the hardened hats they sprinkle it over with water, and mould it; and the heat of the fire, with the water and pressing, imbody the stuff into a slight hairy sort of felt; after which, turning up the edges all round over the mould, they lay it by, and proceed with another, which being in like manner reduced to the same consistence and form, they are both joined together, so as to make them meet in an angle at top, making only one conical cap. The next process is to remove the hat to a trough, resembling a mill-hopper, which is a copper-kettle filled with water and grounds, kept hot for the purpose; and, after being dipped in the kettle, the hat is laid on the sloping side, called the plank. Here they proceed to work it, by rolling and unrolling it again and again, one part after another, first with the hand, and afterwards with a small wooden roller, taking care to dip it from time to time, till at length, by thus fulling and thickening it four or five hours, it is brought to the dimensions intended. In this violent labour,

the workmen usually guard their hands with thick leather, which they call gloves. The hat thus wrought into the form of a conical cap, is reduced into proper shape on a block of the size of the intended crown, by tying it round with a string, called a commander; after which, with a bent iron, called a stamper, they gradually beat down the commander all round, till it has reached the bottom of the block, and what remains at the bottom below the string forms the brim. In this station it is set to dry, and afterwards singed, by holding it over the blaze of a fire, made of straw, or shavings: it is then rubbed with pumice-stone, to take off the coarser nap; then rubbed over with seal-skin, to lay the nap still finer; and lastly, carded with a fine card, to raise the fine cotton, with which the hat is to appear when finished: then fitting it to the block, they tie it, cut round the edges, and deliver it to the dyers. (See the article DYEING.) The dye being completed, the hat is dried by being hung in the roof of a stove heated with a charcoal-fire; and, when dry, it is stiffened with melted glue, or rather gum-senega, which is smeared over the hat with a brush, and rubbed in with the hand. Then, having spread a cloth over the steaming bason, which is a little fireplace raised about three feet high, with an iron-plate laid over it, exactly covering the fire, the hat is laid upon the cloth, with the brim downwards, the cloth being first sprinkled with water, to raise a strong steam, to force in the stiffening. When it is moderately hot, the workman strikes gently on the brim, with the flat of his hand, to make the joinings incorporate and bind so as not to appear, turning it from time to time, and at last setting it on the crown. And when it has been sufficiently steamed and dried, it is put again on the block, brushed, ironed, well smoothed, and fitted for lining.

Hats make a considerable article in commerce: England supplies Spain, Portugal, Italy, and Germany, with extraordinary quantities of them; and as our manufacturers have the reputation of making the best hats in Europe, their importation is prohibited.

HATS are also made for women's wear, of chips, straw, or cane, by plating, and sewing the plats together; beginning with the center of the crown, and working round till the whole is finished. Hats

for the same purpose are also wove and made of horse-hair, silk, &c. Straw-hats knotted, pay on importation 1s.  $3\frac{4}{10}$  d. the dozen, and draw back 1s.  $1\frac{5}{10}$  d.

Straw-hats plain, pay  $3\frac{46\frac{1}{2}}{100}$  d. the dozen, and draw back  $3\frac{3\frac{1}{2}}{100}$  d.

**HAT-BAND**, a band to tie or buckle round the crown of a hat, in order to let it out, or draw it closer to the head. These are of several sorts. They pay on importation 19s. 3d. the gross, and draw back 16s.  $10\frac{5}{10}$  d.

**HATCHEL**, or **HITCHEL**, a tool with which flax and hemp are combed into fine hairs. It consists of long iron-pins, or teeth, regularly set in a piece of board. See plate CXXVII. fig. 2.

There are several sorts of hatchels, each finer than the other, with which flax and hemp are prepared for spinning. See the articles **FLAX** and **HEMP**.

**HATCHES**, in a ship, a kind of trap-doors between the main-mast and fore-mast, through which all goods of bulk are let down into the hold.

*Coamings of the HATCHES*, are the pieces of timber, or planks, which raise up the hatches, when they are made higher than the rest of the deck.

**HATCH-WAY**, the place where the hatches are. Thus, to lay a thing in the hatch-way, is to put it so, that the hatches cannot be come at, or opened.

**HATCHES** also denote flood-gates set in a river, &c. to stop the current of the water, particularly certain dams or mounds made of rubbish, clay, or earth, to prevent the water that issues from the stream-works and tin-washes in Cornwall, from running into the fresh rivers.

**HATCHET**, a small light sort of an ax, with a basil-edge on its left side, and a short handle, as being to be used with one hand.

Hatchets are used by various artificers, and more particularly in hewing of wood.

Hatchets and axes pay on importation 1s.  $3\frac{4}{10}$  d. the dozen, and draw back 1s.  $1\frac{5}{10}$  d. And for every 112 lb. of iron 4s.  $8\frac{2\frac{1}{2}}{100}$  d. which is repaid on exportation.

**HATCHING**, the maturing fecundated eggs, whether by the incubation and warmth of the parent bird, or by artificial heat, so as to produce young chickens alive.

The art of hatching chickens by means of ovens has long been practised in Egypt; but it is there only known to the inhabitants of a single village named Berme, and to those that live at a small distance from it. Towards the beginning of autumn they scatter themselves all over the country, where each person among them is ready to undertake the management of an oven, each of which is of a different size, but in general they are capable of containing from forty to fourscore thousand eggs. The number of these ovens placed up and down the country is about three hundred and eighty-six, and they usually keep them working for about six months: as therefore each brood takes up in an oven, as under a hen, only twenty-one days, it is easy in every one of them to hatch eight different broods of chickens. Every Bermean is under the obligation of delivering to the person who intrusts him with an oven, only two thirds of as many chickens as there have been eggs put under his care; and he is a gainer by this bargain, as more than two thirds of the eggs usually produce chickens. In order to make a calculation of the number of chickens yearly so hatched in Egypt, it has been supposed that only two thirds of the eggs are hatched; and that each brood consists of at least thirty thousand chickens; and thus it would appear that the ovens of Egypt give life yearly to at least ninety-two millions six hundred and forty-thousand of these animals.

This useful and advantageous method of hatching eggs has been lately discovered in France, by the ingenious Mr. Reaumur, who, by a number of experiments, has reduced the art to certain principles. He found by experience that the heat necessary for this purpose is nearly the same with that marked 32 on his thermometer, or that marked 96 on Fahrenheit's. This degree of heat is nearly that of the skin of the hen, and what is remarkable of the skin of all other domestic fowls, and probably of all other kinds of birds. The degree of heat which brings about the developement of the cygnet, the gosling, and the turkey-pout, is the same as that which fits for hatching the canary-songster, and, in all probability, the smallest humming-bird: the difference is only in the time during which this heat ought to be communicated to the eggs of different birds: it will bring the canary bird to perfection in eleven or twelve days, while the

turkey-



turkey-pout will require twenty-seven or twenty-eight.

After many experiments, Mr. Reaumur found that stoves heated by means of a baker's oven, succeeded better than those made hot by layers of dung: and the furnaces of glass-houses and those of the melters of metals, by means of pipes, to convey heat into a room, might, no doubt, be made to answer the same purpose. As to the form of the stoves, no great nicety is required: a chamber over an oven will do very well; nothing more will be necessary but to ascertain the degree of heat, which may be done by melting a lump of butter, of the size of a walnut, with half as much tallow, and putting it into a phial; this will serve to indicate the heat with sufficient exactness, for when it is too great, this mixture will become as liquid as oil, and when the heat is too small, it will remain fixed in a lump; but it will flow like a thick syrup, upon inclining the bottle, if the stove be of a right temper: great attention therefore should be given to keep the heat always at this degree, by letting in fresh air, if it be too great, or shutting the stove more close, if it be too small; and that all the eggs in the stove may equally share the irregularities of the heat, it will be necessary to shift them from the sides to the center; thereby imitating the hens, who are frequently seen to make use of their bills, to push to the outer parts those eggs that were nearest to the middle of their nests, and to bring into the middle such as lay nearest the sides.

Mr. Reaumur has invented a sort of low boxes, without bottoms, and lined with furs. These, which he calls artificial-parents, not only shelter the chickens from the injuries of the air, but afford a kindly warmth, so that they presently take the benefit of their shelter as readily as they would have done under the wings of a hen. After hatching, it will be necessary to keep the chickens, for some time, in a room artfully heated and furnished with these boxes; but afterwards they may be safely exposed to the air in the court-yard, in which it may not be amiss to place one of these artificial-parents to shelter them if there should be occasion for it.

As to the manner of feeding the young brood, they are generally a whole day after being hatched, before they take any food at all; and then a few crumbs of

bread may be given them for a day or two, after which they will begin to pick up insects and grubs for themselves.

But to save the trouble of attending them, capons may be taught to watch them in the same manner as hens do. Mr. Reaumur assures us that he has seen above two hundred chickens at once, all led about and defended only by three or four such capons. Nay, cocks may be taught to perform the same office, which they, as well as the capons, will continue to do all their lives after.

**HATCHING**, or **HACHING**, in designing, &c. the making of lines with a pen, pencil, graver, or the like; and the intersecting or going across those lines with others drawn a contrary way, is called counter-hatching. The depths and shadows of draughts are usually formed by hatching.

Hatching is of singular use in heraldry, to distinguish the several colours of a shield, without being illumined: thus, gules or red is hatched by lines drawn from the top to the bottom; azure, by lines drawn across the shield; and so of other colours. See the article **GULES**, **AZURE**, &c.

**HATCHMENT**, in heraldry, a name sometimes used for an achievement, or escutcheon over a gate, door, or on the side of an house.

**HATCHMENT** also signifies the marshalling of several coats of arms in an escutcheon. See the article **MARSHALLING**.

**HATESBURY**, or **HEYTSBURY**. See the article **HEYTSBURY**.

**HATFIELD**, a market-town of Hertfordshire, situated twenty miles north-west of London.

**HATFIELD-BROADOAK**, or **KING'S HATFIELD**, a market-town of Essex, twelve miles from Chelmsford, and twenty-eight from London.

**HATHERLY**, a market-town of Devonshire, twenty miles north-west of Exeter.

**HATTEM**, a town of Gelderland, one of the United Provinces: east long. 6°, north lat. 52° 36'.

**HATTOCK**, a flock of corn containing twelve sheaves: others make it only three sheaves laid together.

**HATUAN**, a town of upper Hungary, fifteen miles north-east of Buda: east lon. 19° 35'. and north lat. 47° 48'.

**HAVANNA**, a port-town of the island of Cuba, in America, situated at the entrance of the gulph of Mexico; sub-

ject to Spain: west lon.  $84^{\circ}$ , and north lat.  $23^{\circ}$ .

**HAVANT**, a market-town of Hampshire, six miles north-east of Portsmouth.

**HAVEL**, a river of Brandenburg, in Germany, which receives the river Spree, near Berlin, and discharges itself into the Elbe, a little below Havelburg.

**HAVELBURG**, a town of Germany, in the circle of upper Saxony, and marquisate of Brandenburg, subject to the king of Prussia: east long.  $12^{\circ} 44'$ , and north lat.  $53^{\circ}$ .

**HAVEN**, a sea-port or harbour. See the article **HARBOUR**.

**HAVER**, a term used by country-people for oats.

**HAVERFORD-WEST**, a borough-town of Pembrokeshire, in south Wales, situated twelve miles south-east of St. David's. It sends only one member to parliament.

**HAVERIL**, a market-town of Essex, twenty-four miles north of Chelmsford.

**HAUGH**, or **HAW**. See the article **HAW**.

**HAUNCH**, or **HANCH**, the hip, or that part of the body between the last ribs and the thigh. See the article **HIP**.

The haunches of a horse are too long, if, when standing in the stable, he limps with his hind legs farther back than he ought; and when the top or onset of his tail is not in a perpendicular line to the tip of his hocks, as it always does in horses whose haunches are of a just length. There are some horses, which, though they have too long haunches, yet commonly walk well: such are good to climb hills, but are not at all sure upon a descent, for they cannot ply their hams, and never gallop slowly, but always nearly upon a full speed.

The art of riding the great-horse has not a more necessary lesson than that of putting a horse upon his haunches, which in other words is called coupling him well, or putting him well together, or compact. A horse that cannot bend or lower his haunches, throws himself too much upon his shoulder, and lies heavy upon the bridle.

**HAUNT**, among sportsmen, the place to which game are accustomed to resort: among hunters, it is the walk of a deer, or the place of his ordinary passage.

All kinds of large fowl that divide the foot, have their haunts by the sides of shallow rivers, brooks, and plasies of water; they delight in boggy places and the dry parts or fens over-grown with rushes, reeds, and sedges, in half drown-

ed moors, and the hollow vales of downs and heaths, where there is shelter for them to lurk in obscurity. These do not appear in flocks, but they are the best flight for hawks that can be imagined.

The lesser fowl, which are web-footed, continually haunt drowned fens, the main stream of rivers where the current is swiftest, and all places where there is plenty of water, in which they may swim undisturbed by man or beast; the wild-geese and barnacle excepted, who like no water above their sounding, and seek none but shallow places. These last are inconceivably delighted with green winter corn, and may always be found where it is sown, especially if the ends of the lands have much water about them.

The smaller fowl frequent small brooks, rivers, ponds, drowned meadows, loughs or lakes, especially if stored with unfrequented islands well furnished with shrubs, rushes, reeds, &c.

**HAVRE**, in geography, a french term signifying haven. Hence,

**HAVRE DE GRACE** is a port-town of France, in the province of Normandy, situated on the English channel, at the mouth of the river Seyne: east longit.  $10'$ , and north lat.  $49^{\circ} 30'$ .

**HAUTBOY**, a musical instrument of the wind-kind, shaped much like the flute, only that it spreads and widens towards the bottom, and is sounded through a reed. The treble is two feet long; the tenor goes a fifth lower, when blown open: it has only eight holes; but the bass, which is five feet long, has eleven.

**HAW**, in botany, &c. a sort of berry, the fruit of several species of *meipilus*, thence denominated haw-thorns. See the article **MESPILUS**.

**HAW**, among farriers, an excrescence resembling a gristle, growing under the nether eye-lid and eye of a horse, which, if not timely removed, will put it quite out. It proceeds from grofs, tough, and phlegmatic humours, which falling from the head, and there uniting together, grow to this infirmity; the signs of which are the watering of the eye, and the involuntary opening of the under eye-lid.

Every farrier can cut it out; but ordinarily the horse must be held fast by the head, and a needle with a strong double thread run through the middle of his upper eye-lid, which must be held open by the thread's being tied to his head: a needle and thread should then be run through the haw, when cutting the skin round

round with a sharp pen-knife, the hawk may be plucked out. Then take the blood out of his eye, wash it with beer or ale, and put in a good deal of salt; afterwards wash it again, and stroking it down with your own hand, let him go. Sheep are cured of this malady by dropping into the eye the juice of chamomile or crows-foot.

**HAW-FINCH**, in ornithology, the english name of a bird, known among authors by the name *coccothraustes*.

**HAWK**, a synonymous term with *falcon*, though, by some, restrained to the lesser sort of falcons. See the articles *FALCON* and *FALCONRY*.

Others distinguish hawks into the long-winged and short-winged kinds: of the first kind are the gentle-falcon, *gerfalcon*, *lanner*, *faker*, *hobby*, &c. See the articles *FALCON*, *GERFALCON*, &c.

And of the short-winged kind are the *goshawk*, *sparrow-hawk*, *stanyel*, &c. See the articles *GOSHAWK*, *SPARROW-HAWK*, &c.

Here it is to be observed, that the female hawks, as well as of all other birds of prey, being larger and more robust than the males, are likewise more hardy, bold, and serviceable.

**HAWKER**, in commerce, a pedlar, or person that goes about the country selling wares: this name is said to arise from their uncertain wandering, like persons who with hawks seek their game where they may find it.

Every hawker, &c. must take a licence, for which he must pay 4*l.* and if with horse, ass, or mule, for every one of them 4*l.* a-piece: if he travels without, or contrary to his licence, he forfeits for every offence, to the informer and the poor of the parish where discovered, 12*l.* If he travels with a forged licence, he forfeits 50*l.* and if he refuses to shew his licence 5*l.*

The acts relating to hawkers do not extend to the makers of goods or their agents; to those who sell goods in fairs or markets; to the sellers of fish, fruit, or other victuals; nor to the vendors of acts of parliament, proclamations, forms of prayer, almanacs, books, and newspapers.

**HAWKING**, the exercise of taking wild-fowl by means of hawks.

The method of reclaiming, manning, and bring up a hawk to this exercise, is called *falconry*. See *FALCONRY*.

As for the exercise itself, though at present much disused, it furnishes a great variety of terms still retained in our language, as *gleam*, *leash*, *pannel*, *quarry*, *train*, *feeling*, &c.

When your hawk comes readily to the lure, a large pair of luring-bells are to be put upon her; and the more giddy-headed, and apt to rake out, your hawk is, the larger must the bells be. Having done this, and she being sharp-set, ride out in a fair morning, into some large field unencumbered with trees or wood, with your hawk on your fist; then having loosened her hood, whistle softly, to provoke her to fly, unhood her, and let her fly with her head into the wind, for by that means she will be the better able to get upon the wing, and will naturally climb upwards, flying a circle. After she has flown three or four turns, then lure her with your voice, casting the lure about your head, having first tied a pullet to it; and if your falcon come in, and approach near you, cast out the lure into the wind, and if she stoop to it, reward her.

You will often find, that when she flies from the fist, she will take stand on the ground: this is a fault, which is very common with *soar-falcons*. To remedy this, fright her up with your wand; and when you have forced her to take a turn or two, take her down to the lure, and feed her. But if this does not do, then you must have in readiness a duck sealed, so that she may see no way but backwards, and that will make her mount the higher. Hold this duck in your hand, by one of the wings near the body; then lure with the voice, to make the falcon turn her head, and when she is at a reasonable pitch, cast your duck up just under her, when, if she strike, stoop, or trust the duck, permit her to kill it, and reward her by giving her a reasonable gorge. After you have practised this two or three times, your hawk will leave the stand, and delighted to be on the wing, will be very obedient.

It is not convenient, for the first or second time, to shew your hawk large fowl; for it frequently happens, that they escape from the hawk, and she not recovering them, rakes after them: this gives the falconer trouble, and frequently occasions the loss of the hawk. But if she happens to pursue a fowl, and being unable to recover it, gives it over, and comes

comes in again directly, then cast out a sealed duck, and if she stoop and truſt it a-croſs the wings, permit her to take her pleaſure, rewarding her alſo with the heart, brains, tongue, and liver. But if you have not a quick duck, take her down with the dry lure, and let her plume a pullet and feed upon it. By this means a hawk will learn to give over a fowl that rakes out, and on hearing the falconer's lure, will make back again, and know the better how to hold in the head.

Some hawks have a diſdainful coynefs, proceeding from their being high fed: ſuch a hawk muſt not be rewarded, tho' ſhe ſhould kill; but you may give her leave to plume a little, and then taking a ſheep's-heart cold, or the leg of a pullet, when the hawk is buſy in pluming, let either of them be conveyed into the body of the fowl, that it may ſavour of it; and when the hawk has eaten the heart, brains, and tongue of the fowl, take out what is incloſed, call her to your fiſt, and feed her with it: afterwards give her ſome of the feathers of the fowl's neck, to ſcower her, and make her caſt.

If your hawk be a ſtately high-flying one, ſhe ought not to take more than one flight in a morning; and if ſhe be made for the river, let her not fly more than twice: when ſhe is at the higheſt, take her down with your lure; and when ſhe has plumed and broken the fowl a little, feed her, by which means you will keep her a high-flyer, and fond of the lure.

**HAWSER**, in the ſea-language, a large rope, or a kind of ſmall cable, ſerving for various uſes a-board a ſhip, as to faſten the main and fore ſhrouds, to warp a ſhip as ſhe lies at anchor, and wind her up to it by a capſtan, &c. The hawſer of a man of war may ſerve for a cable to the ſheat-anchor of a ſmall ſhip.

**HAWSES**, in a ſhip, are two large holes under the bow, through which the cables run when ſhe lies at anchor. Thus the hawſe-pieces are the large pieces of timber in which theſe holes are made. Hawſe-bags, are bags of canvas made tapering, and ſtuffed full of ocham; which are generally allowed ſmall ſhips, to prevent the ſea from waſhing in at theſe holes: and hawſe-plugs, are plugs to ſtop the hawſes, to prevent the water from waſhing into the manger.

There are alſo ſome terms in the ſea-language that have an immediate relation to the hawſes. As a *boid hawſe*, is when

the holes are high above the water. *Frefh the hawſe*, or veer out more cable, is uſed when part of the caple that lies in the hawſe is fretted or chafed, and it is ordered that more cable may be veered out, ſo that another part of it may reſt in the hawſes. *Frefh the hawſe*, that is, lay new pieces upon the cable in the hawſes, to preſerve it from fretting. *Burning in the hawſe*, is when the cables endure a violent ſtreſs. *Clearing the hawſes*, is diſentangling two cables that come thro' different hawſes. *To ride hawſe-full*, is when in ſtreſs of weather the ſhip falls with her head deep in the ſea, ſo that the water runs in at the hawſes.

**HAY**, any kind of graſs, cut and dried, for the food of cattle.

The time of mowing graſs for hay, muſt be regulated according to its growth and ripeneſs; nothing being more prejudicial to the crop than mowing it too ſoon, becauſe the ſap is not then fully come out of the root, and when made into hay, it ſhrinks away to nothing. It muſt not, however, be let ſtand too long, till it have ſhed its ſeeds. When the tops of the graſs look brown, and begin to bend down, and the red honey-ſuckle flowers begin to wither, you may conclude it ripe for mowing.

As ſoon as your graſs is mowen, if there is plenty of it, and it be thick in the ſwath, the hay-makers ſhould follow the mowers, and ſpread the ſwaths (unleſs you fear wet,) which is called tedding of them. At night, make it into cocks; and next day, as ſoon as the dew is off the ground, ſpread it again, and turn it, that it may dry on the other ſide. In this manner it is to be ſpread, turned, and made into cocks at night, till fully dry; and in caſe the weather ſeems to threaten rain, it ſhould be made into larger cocks, whereby it will be ſecured from wet, tho' let ſtand a day or two. Where thick-leaved weeds are among the graſs, it will require more drying and turning than ordinary.

Mowing of land too often is a great prejudice to it, unleſs conſtantly renewed by land-floods or manure; ſo that where theſe conveniencies cannot be had, the lands ſhould be fed once in two or three years; feeding being as neceſſary for hay-ground, as fallowing is for corn-grounds.

*Saint-foin*-HAY, is of ſeveral ſorts, which may be diſtinguiſhed by the following terms.

terms, *viz.* 1st. The virgin. 2dly. The blossomed. 3dly. The full-grown. And, 4thly. The threshed hay. The first of these is beyond comparison the best. It must be cut before the blossoms generally appear; for when it stands till it is full blown, the most spirituous and nourishing parts of its juice are spent, the sap is much impoverished, and the saint-foin can never recover that richness it had in its virgin-state. But this fine hay cannot well be had of uncultivated saint-foin, because that may not be much above an handful high when it is in a condition to be cut; it would then make a very light crop, and would be a great while before it sprang up again; but the rich will have two or three tuns to an acre, and spring again immediately for a second crop; so that little or none in quantity would be lost by so great an improvement of its quality.

The second sort is that cut in the flower, which, tho' much inferior to the virgin-hay, far exceeds any other kind as yet commonly propagated in England; and if it be a full crop, it may amount to three tuns an acre. This is that saint-foin which is commonly made, and the larger it is, the more nourishing it is for horses.

The next sort of saint-foin is the full grown, cut when the blossoms are gone, or going off: this also is good hay, tho' it falls short by many degrees of the goodness of the other two sorts: but it makes a greater crop than either of them, because it grows to its full bulk, and shrinks little in drying.

The last sort is the threshed hay, which when not damaged by wet weather, has been found more nourishing to horses than coarse water-meadow hay; and, when it is cut small by an engine, is good for cattle, and much better than the chaff of corn. The best time to cut it, is when the greatest part of the seed is well filled; the first-blown ripe, and the last-blown beginning to be full.

The goodness of the hay depends greatly upon the manner of ordering it. The best hay in all England is made of saint-foin, without ever spreading it. This method, tho' it be longer before it be finished, costs less labour than the other. If saint-foin be laid up pretty green, it will take no damage, provided it be set in small round ricks, with a large basket drawn up in the middle of each, to have a vent hole through which the super-

fluous moisture of the hay may transpire. As soon as its heating is over, these ricks ought to be thatched; and all saint-foin ricks, that are made when the hay is full dried in the cocks, ought to be thatched immediately after the making them. That which is laid up most dried, will come out of the rick of a green colour; but that which has been much heated in the rick, will be brown.

The seed affords the owner another opportunity of making a profit of his saint-foin: but this, if the hoeing husbandry were general, would not be vendible in great quantities for planting; because the ordinary crop of an acre, will produce seed enough to drill an hundred acres, which would not want planting for a long time. The other use then of this seed is for provender; and it has been affirmed by some, who have made trials of it, that three bushels of good saint-foin seed given to horses, will nourish them as much as four bushels of oats; and when well ordered, it is so sweet, that most sorts of cattle are greedy of it.

**HAY**, in geography, a market-town in Brecknockshire, south Wales, thirteen miles north-east of Brecknock.

**HAY-BOTE**, in law, a liberty to take thorns, and other wood, to make and repair hedges, gates, fences, &c. by a tenant for life or years.

**HAY-BOTE** is also taken for wood for the making of rakes and forks, used in making hay.

**HAYLESHAM**, a market-town of Suffex, situated ten miles east of Lewes.

**HAY-MARKET**, a particular place in London, or its suburbs, where hay is sold, and where all carts of hay that stand to be sold there pay 3d. per load towards paving the streets. The new hay sold in London, &c. between the first of June and the last of August, ought to weigh sixty pounds a truss; and old hay, the other part of the year, is to weigh fifty-six pounds, the seller being liable to forfeit 2s. 6d. for every truss under that weight.

**HAYN**, a town of Silesia, in the territory of Lignitz, thirty-five miles north-west of Breslaw: east long. 16° 5', north lat. 51° 17'.

**HAYNAN**. See the article **HAINAN**.

**HAYNAULT**, a province of the Netherlands, bounded by Brabant and Flanders, on the north; by Namur and Liege, on the east; by the Cambrésis, Picardy, and Champaign, on the south; and by Artois,

Artois, and another part of Flanders, on the west: the north part is subject to the house of Austria, and the south part to France. Its capital is Mons.

**HAYWARD**, the person who keeps the common herd or cattle of a town.

He is appointed by the lord's court, and his office is to see that the cattle neither break nor crop the hedges of inclosed grounds; he is also to look to the fields, and impound cattle that commit trespass therein.

**HAZARD**, a game on dice, without tables, is very properly so called; since it speedily makes a man, or undoes him.

It is played with only two dice; and as many may play at it as can stand round the largest round table.

Two things are chiefly to be observed, *viz.* main and chance; the latter belonging to the caster, and the former, or main, to the other gamblers. There can be no main thrown above nine, nor under five; so that five, six, seven, eight, and nine, are the only mains flung at hazard. Chances and nicks are from four to ten: thus four is a chance to nine, five to eight, six to seven, seven to six, eight to five; and nine and ten a chance to five, six, seven, and eight: in short, four, five, six, seven, eight, nine, and ten, are chances to any main, if any of these nick it not. Now nicks are either when the chance is the same with the main, as five and five, or the like; or six and twelve, seven and eleven, eight and twelve. Here observe, that twelve is out to nine, seven, and five; eleven is out to nine, eight, six, and five; and aces-ace and duce-ace, are out to all mains whatever.

But to illustrate this game by a few examples: suppose the main to be seven, and the caster throws five, which is his chance; he then throws again, and if five turn up, he wins all the money set him; but if seven is thrown, he must pay as much money as there is on the board: again, if seven be the main, and the caster throws eleven, or a nick, he sweeps away all the money on the table; but if he throws a chance, as in the first case, he must throw again: lastly, if seven be the main, and the caster throws aces-ace, duce-ace, or twelve, he is out; but if he throws from four to ten, he hath a chance; though they are accounted the worst chances on the dice, as seven is reputed the best and easiest main to be flung. Four and five are

bad throws (the former of which being called by the tribe of nickers, little dick-fisher) as having only two chances, *viz.* trey-ace and two duces, or trey-duce and quarter ace: whereas seven hath three chances, *viz.* cinque-duce, six-ace, and quarter-trey. Nine and ten are in the like condition with four and five; having only two chances. Six and eight have indeed the same number of chances with seven, *viz.* three; but experienced gamblers nevertheless prefer the seven, by reason of the difficulty to throw the doublets, two quaters, or two treys. It is also the opinion of most, that at the first throw, the caster hath the worst of it. On the whole, hazard is certainly one of the most bewitching and ruinous games played on the dice. Happy, therefore, the man who either never heard of it, or who has resolution enough to leave it off in time. See the articles CHANCE and GAMING.

**HAZLE**, *corylus*, in botany. See the article CORYLUS.

*Witch-HAZLE*, a name sometimes given to the elm. See the article ELM.

**HAZLE-EARTH**, or **HAZLEY-EARTH**, in agriculture, a kind of red loam, which is said to be an excellent mixture with other sorts of earth; uniting what is too loose, cooling what is too hot, and gently entertaining the moisture.

The best manure for a hazley soil is marl, chalk, and sea-coal ashes. See MARL, CHALK, and ASHES.

**HAZLE-HEN**, a bird of the size of a moderately grown pullet; it is a species of tetrao, with a grey tail, spotted and fasciated with black, frequent in many parts of Europe. See the article TETRAO.

**HEA**, a province of the empire of Morocco, situated on the ocean, south-west of Morocco proper.

**HEAD**, *caput*, in anatomy, the uppermost part of the body of an animal.

The head is the first of the five divisions into which anatomists distinguish the human body, consisting of the head, neck, thorax, abdomen, and extremities. See the article NECK, &c.

The first parts to be distinguished in the head, are the hairy part, or scalp; and the naked part, or the face; after which we are to attend to the division into the sinciput and occiput, the fore and hinder part of the head; the temples, the crown, or vertex; the bucca, the cheeks, and the philtrum, or lacuna. See the articles SCALP, FACE, &c.

The coverings of the head are, first, the hair; secondly, the skin; thirdly, the membrana cellulosa; and, fourthly, the muscles. See **HAIR**, **CUTIS**, &c.

Besides the external integuments of the head, there is an aponeurotic expansion which covers the head like a cap, and is spread round the neck, and on the shoulders, like a riding-hood; and for this reason Winslow gives it the name of coif, and calls the superior portion of it the aponeurotic cap.

The head contains in the cavity of the bones of the skull the chief organ, or primum mobile of the whole animal oeconomy; the face is the seat of several other particular organs, which are greatly compounded. The proper containing parts of the head are the frontal muscles, the pericranium, and the bones of the skull: the parts contained are the membranes of the brain, the brain itself, and the vessels. See **BRAIN**.

With regard to the bones of the head, it may be observed, that the head expresses that part of the skeleton which is placed upon the top vertebra of the neck, and in this view is divided into the cranium or skull, and maxillæ. See the articles **SKULL** and **MAXILLÆ**.

The whole head of the skeleton is spheroidal, composed as it were of two ovals a little depressed on each side: one of them is superior, the extremities pointing forward and backward; the other is anterior, the extremity being turned upwards and downwards, in such a manner as that one extremity of each oval meets, and is lost in the other, at the place particularly known by the name of the forehead.

This complex figure being viewed sideways, represents a spheroidal triangle; and we ought farther to observe, that the oval of the skull is broader behind than before, and that of the face broader above than below.

For the arteries and veins of the head, see the articles **ARTERY** and **VEIN**.

For the glands and muscles, see the articles **GLAND** and **MUSCLE**.

*Diseases of the HEAD*, are often mistaken, even by physicians, for those of other parts. Some physicians tell us, that those who are subject to disorders of the head, ought not to take any food at night.

**HEAD-ACH**, a most troublesome sensation in the nervous membranes of the head, produced by various causes, and attended

with different symptoms, according to its different degrees, and the place where it is seated.

The most common seat of this disease is the pericranium. It may likewise be in the skin that covers the skull, and in the dura mater: this last but seldom happens, but when it does it is very dangerous. There may likewise be a very acute pain in the thin membrane that covers the sinus of the os frontis.

If the head-ach be slight, and affects a particular part of the head, it is called cephalalgia; if the whole, cephalæa; if one side only, hemicrania; if there is a fixed pain on the top of the head which may be covered with the end of the thumb, it is called clavus hytericus. The general cause of the head-ach, according to Hoffman, is a hindrance of the free circulation of the blood through the vessels of the head.

When the blood rushes with impetuosity, and in too great plenty into the membranes, which may happen to the plethoric, to those whose usual bleeding at the nose is suppressed, and to young persons, there is a pain in the whole head, which becomes hot, swells, aches, and looks red; the vessels swell, and there is a strong pulsation in those of the neck and temples. The nostrils are dry and parched; there is a burning heat, and drought in the fauces.

When the vessels of the head are stuffed with a mucous serum from a stoppage of the running of the nose, then there is a heavy obtuse pressing pain chiefly in the fore part of the head, in which there seems to be such a weight, that the patient can scarce hold it up: sometimes the skin is so swelled that it will pit; sometimes it happens from the ferous, sharp, caustic matter of the french disease, which infects the pericranium, and often causes a caries in the skull: sometimes it may proceed from matter of a saline, caustic nature, driven back from the external parts, as in the gout, itch, erysipelas of the head, gutta rosacea, the small-pox and measles, before the morbid matter is expelled to the outward skin, or, which is worse, when it is driven back. In these cases where a small quantity of caustic matter causes the pain, it rather proceeds from a violent stricture of the membranes than from their distention.

There is likewise a most violent, fixed, constant, and almost intolerable head-

which brings on a debility both of body and mind, hinders sleep, disturbs digestion, destroys the appetite, causes a vertigo, dimness of sight, blindness, a noise in the ears, convulsions, and the epilepsy; and by consent of the other nervous parts of the body, produces vomiting, costiveness, coldness of the extreme parts, and the countenance of a dying person. Sometimes the head-ach is symptomatic, and attends upon continual and intermitting fevers, and especially the quartan, irregular flowing of the menses, the hypochondriac passion, and the like. A hemi-crania generally proceeds from a fault in the stomach from crudities or indigestion, and commonly appears when digestion is performed.

The curative indications are, 1. To divert the impetus of the blood and humours from the head, and to discuss them by suitable remedies. 2. To relax the spastic strictures of the membranes, the cause of which is a sharp caustic matter, that the fluids may have a more free circulation. 3. To correct the peccant matter, and evacuate it gently through the most convenient emunctories. 4. To prevent a return by strengthening the whole nervous system, by proper remedies, and especially by an accurate diet and regimen.

When the blood rushes to the head in too great quantity, bleeding is necessary, more particularly under the tongue, in the forehead, in the jugulars, or by leeches behind the ears. If the body abounds with too much blood, it will be best to bleed in the ankle first, and the next day, or a day after, in a vein about the head. But first of all cleanse the body by an emollient clyster, or by giving an infusion of rhubarb and manna, with cream of tartar.

To restrain the orgasm of the blood, it will be proper to give a diaphoretic and absorbent mixture, with diaphoretic antimony, purified nitre, burnt hart's horn, and diacodium, diluted with a sufficient quantity of suitable simple distilled waters. But if the head-ach proceeds from a copious vitiated serum stagnating in the membranes, either within or without the skull, with a dull heavy continual pain, which will neither yield to bleeding nor gentle laxatives, then more powerful remedies are required to dissolve the thick glutinous humours, and to carry them off by stool.

Take of pure gum ammoniac, sagape-

num, the best myrrh, roseated aloes, extract of black hellebore, resin of jalap, mercurius dulcis, and prepared cinnabar, each half a dram; of the extract of saffron, of the powder of castor, and of the salt of amber, each fifteen grains. Make them into a mass; out of every scruple of which make twelve pills; six of which may be taken at night, and the other six in the morning. On the day the pills are taken, let the patient take nothing but thin broths. After three days, they may be repeated again: when the vitiated serum has been sufficiently evacuated, then give strengthening remedies mixt with diuretics; at the same time the patient should use exercise to make him sweat, with strong frictions, and such aliment and liquors as tend to promote a discharge by urine. See DIURETIC. If this method fails of success, apply a blister made with an ounce of the emplastrum attrahens, and a dram of cantharides, adding a few grains of camphor. It may be of the size of a crown-piece, and applied to the nape of the neck; it should be often renewed, and continued for a long time. When the disease is evident to the sight and touch, from the serum stagnating under the skin of the head, a blister may be laid all over the head, with great advantage. See the article VESICATORY.

When there is any intense pain remaining fixed in one place lying pretty deep in the membranes, the herb ranunculus used as a vesicatory, has a wonderful efficacy: the leaves must be bruised in a marble mortar, and the part, if hairy, shaved; then a sticking plaster is to be laid on it, with a hole about the bigness of a silver-penny, and the leaves over that, just in the same manner as a caustic. See the article CAUSTIC.

If it is caused by a suppression of a coryza, a smelling-bottle of volatile salts should be held frequently to the nose, or the patient may take herb snuff, with the addition of flowers of benjamin and powder of cloves. See CATARRH.

When the head-ach arises from a corrupted mass of blood and an impure serum, as in the scurvy, and lues venerea, a decoction of the woods, with crude antimony, may be serviceable, after evacuations with the pills recommended above. Fasting a day now and then with labour and exercise, may be useful; as also a sudorific. See the articles EXERCISE and SUDORIFIC.

A hemi-



A hemicrania, especially a periodical one, is generally owing to a foulness in the stomach, and primæ viæ, for which gentle emetics will be beneficial; as also purgatives, to drive the humours from the head; afterwards stomachics. If it proceeds from profuse evacuations of the menes or hæmorrhoids, those fluxes must be reduced within bounds. See the article **FLUX**, &c.

If the head-ach is so intolerable as to endanger the patient's life, or is attended with continual watching, fainting fits, a fever, an inflammation, or a delirium, recourse must be immediately had to opiates, with native cinnabar, after a clyster has been first given. When there is an intolerable pain in the sinuses of the nose, or the boney sinuses of the head, produced by an extravasation of some fluid, the only cure is scarification of the nostrils, or causing the nose to bleed with a straw suddenly thrust therein, See the article **EXTRAVASATION**.

If there is an extravasation under the pericranium, and the humour is so sharp as to begin to render the bone carious, then recourse must be had to incision, as in a whitlow. See **WHITLOW**.

If the head-ach arises from a sudden orgasm in the blood, proceeding from heat, exercise, or labour, evacuations of any kind are not proper, but rather cooling draughts with nitre.

**HEAD-MOULD-SHOT**, a disorder affecting new-born infants, in which the edges of the bones of the cranium at the sutures, especially the coronal one, lie over one another, so that the fibres of the meninges are stretched, and torn asunder, and the brain itself compressed; whence convulsions frequently happen that carry them off.

The head-mould-shot is a disorder opposite to the horse-shoe-head. See the article **HORSE-SHOE-HEAD**.

**Ulcers and eruptions of the HEAD**. There are several ulcers or eruptions, which the hairy part of the head is subject to, and which the writers in medicine have distinguished by the several names of tineæ, favi, and achores, for the treatment and account of which, see the articles **ACHOR** and **TINEA**.

When the achor extends itself to the face, it is known by the name of crusta lactea. See **CRUSTA LACTEA**.

*For the wounds of the HEAD*. See the articles **WOUND**, **FISSURE**, **CONTRA-**

**FISSURE**, **FRACTURE**, **TREPAN**, &c. Mr. le Dran, in his observations on the wounds of the head, shews how much more dangerous the case is, when the cranium does not break by violent blows, &c. than when it is fractured, because of the greater commotions of the brain, &c. and therefore concludes it necessary to perform the operation of the trepan oftener than is commonly practised.

**HEAD** is also used for the top or extremity of any thing; thus we say the head of a tree, the head of a bone, the head of a muscle, the head of a nail, &c.

**HEAD**, in architecture, an ornament of carved work, or sculpture, frequently serving as the key of an arch, or plat-band, on other occasions.

These sort of heads usually represent some of the heathen divinities, virtues, seasons, ages, &c. with their attributes, as a thunderbolt for Jupiter, a diadem for Juno, a trident for Neptune, a crown of ears of corn for Ceres, a helmet for Mars, a caduceus for Mercury, &c.

The heads of beasts are also used in places suitable, as an horse's head for an equester; a deer's or boar's head, for a park or forest; a dog's head for a kennel; a bullock's or sheep's, for a shambles or market-house. In the metopes, friezes and other parts of certain antique doric temples, we see representations of bullocks, or rams-heads, as a symbol of the sacrifices offered there.

**HEAD**, in heraldry. The heads of men, beasts, or birds, are very frequent in armoury, and borne either full-faced, looking forward, or side-faced in profile, when only one half of the face appears, which differences ought to be mentioned in blazoning, to avoid mistakes; as a head, or heads fronting; or a head, or heads side-faced, or in profile: thus, Vert, a chevron gules, between three turks-heads couped side-faced proper, is borne by the name of Smith. And again, Or, a cross gules, between four blackmoors heads, couped at the shoulders proper, is borne by the name Juxon. As the head is the principal part of the body, so it is of course the noblest bearing.

Among medalists, the different heads on antient coins, are distinguished by the different dresses thereof. See **MEDAL**.

In the imperial medals, where the head is quite bare, it is usually a sign the person was not an emperor, but one of the children of an emperor, the presumptive

heir of the empire. The heads which are covered, are either covered with a diadem, or a crown, or a simple cask, or a veil, with some other foreign covering; whereof the diadem is the most antient. The heads of deities are distinguished by some special symbol thereof.

**HEAD**, among huntsmen, is used for the horns of a deer, as a hart, buck, &c. See **ANTLERS**, **ROYALS**, **CROCHES**, &c.

**HEAD**, in the manege. Head of a horse imports the action of his neck, and the effect of the bridle, and the wrist: this horse plants his head well, and obeys the hand; such a horse refuses to place his head; he shoots out his nose, and never rests right on the hand, &c. For the properties of the head of a horse. See **HORSE**. To give a horse head. See the articles **PARTIR** and **ECHAPER**.

**HEAD** in and likewise the hips. You must passage your horse-head and croupe in, *i. e.* work him side-ways upon two parallel lines, at step or trot, so that when the horse makes a volt, his shoulders mark a pisse, or tread at the same time, that his haunches give the tract of another, and the horse plying or bending his neck, turns his head a little within the volt, and so looks upon the ground he is to go over.

**HEAD**, in the military art. Head of a work is the front of it next the enemy, and farthest from the place, as the front of a hornwork is the distance between the flanked angles of the demibaftions; the head of a double tenaille is the salient angle in the middle; and the two other sides which form the re-entrant angles. See the article **FRONT**, &c.

**HEAD**, in painting, sculpture, &c. a representation of that part of the human body, whether in colours, draught, or creux: if taken from the life, or supposed to bear a just resemblance to the person, it is more properly called portrait. See the article **PORTRAIT**.

**HEAD-BOROW**, the person who is chief of the frank-pledge in boroughs, or who antiently had the government within his own pledge. See **FRANK-PLEDGE**.

**HEAD-BOROWS**, at this time, are a kind of constables. See **CONSTABLE**.

**HEAD-FARCIN**. See the article **FARCIN**.

**HEAD-LAND**, in husbandry, is taken to signify the upper part of land left for the turning of the plough.

**HEAD-LAND**, in the sea-language. See **LAND**, **HEAD-LINES**, in a ship, those ropes of all sorts which are next to the yards, and

by which the sails are made fast to the yard. See **SAIL** and **YARD**.

**HEAD-PENCE**, a certain sum antiently collected by the sheriff of Northumberland, of the inhabitants of that county, without any account to be given thereof to the king, which exaction was abolished by Hen. VI.

**HEAD-SEA**, is when a great wave or billow of the sea comes right a-head of the ship, as she is in her course.

**HEAD-SAILS**, in a ship, those which belong to the fore-mast, and bolt-sprit: for it is by these that the head of the ship is governed, and made to fall off and keep out of the wind; and these in quarter-winds are the chief drawing sails.

**HEAD-SILVER**, a fine paid to the lords of the leet. See the article **COMMON-FINE**.

**HEAD-STALL**, in the manege. See the article **CAVESON**.

**HEAD-STALL**, among musicians. See the article **PHORBÆA**.

**HEAD-TIN**, in metallurgy, a preparation of tin-ore toward the fitting it for working into metal. When the ore has been pounded and twice washed, that part of it which lies uppermost, or makes the surface of the mass in the tub, is called head-tin: this is separated from the rest, and after a little more washing becomes fit for the blowing-house.

**HEAD of a ship**, or other vessel, is the prow, or that part which goes foremost.

**Moor's HEAD** is understood of a horse with a black head and feet; the body being usually of a roan colour. Among engineers a moor's head is used for a kind of bomb or granado shot out of a cannon. Among chemists it is a cover, or capital, of an alembic; having a long neck to convey the vapours raised by the fire into a vessel, which serves as a refrigeratory. See **ALEMBIC**.

**Dragon's HEAD**, in astronomy, &c. is the ascending node of the moon, or other planet. See the article **NODE**.

**HEADS**, a term used by builders for that kind of tile which they use to lay at the eaves of a house; being the full breadth of a common tile, and but half a tile in length. See the article **TILE**.

**HEADFORD**, a town of Galway, in Ireland, twelve miles north of the city of Galway.

**HEADON**, or **HEYDON**. See **HEYDON**, **HEALFANG**, or **HALSFANG**. See the article **HALSFANG**.

**HEALING**, is used, by surgeons, for the curing of wounds, ulcers, and other sores.

See

See the articles **WOUND**, **ULCER**, **TUMOUR**, &c.

**HEALING**, in architecture, the covering a roof with lead, tiles, slate, or the like.

**HEALTH**, is a right disposition of the body, and of all its parts ; consisting in a due temperature, a right conformation, just connection, and ready and free exercise of the several vital functions.

Health admits of latitude, as not being the same in all subjects, who may yet be said to enjoy health.

That part of medicine, which shews the means of preserving health, is termed *hygiene*. See the article **HYGIENE**.

The Greeks and Romans deified health, representing it under the figure of a woman, whom they supposed to be the daughter of *Æsculapius*. We find the name of the goddess *Salus*, or health, on many medals of the roman emperors, with different inscriptions, as *SALUS PUBLICA*, *SALUS REIPUBLICÆ*, *SALUS AUGUSTI*, &c.

**HEAM**, in beasts, is the same with the *secundines*, or after-birth in women.

The medicines proper to expel it, are thyme, winter-savoury, and penny-royal, boiled in white wine and given inwardly ; as also common hore-hound stewed in white wine. Dittany put up in form of a pessary, drives out a dead foal, and brings away the *secundines*. Angelica produces the same effect ; so does parsley-seed, alexanders, hops, fennel, favin, and bay-berries.

**HEAN**, a town of Tonquin, in the farther India, situated on the river Domea, eighty miles north of the bay of Tonquin : east long. 107°, north lat. 22°.

**HEARING**, *auditus*, the sense whereby we perceive sounds. See **SOUND**.

The organ of hearing is the ear, and particularly the auditory nerve and membrane. See the article **EAR**.

This membrane, in the various degrees of tension and relaxation, adapts itself to the several natures and states of sonorous bodies ; becoming tense for the reception of acute sounds, and relaxed for the admission of grave sounds. In short, it is rendered tense and relaxed in a thousand different degrees, according to the various degrees of acuteness or gravity in sounds.

Sound, then, is in effect nothing but a certain modulation of the air, which being collected by the external ear, passes thro' the *meatus auditorius*, and beats upon the membrane of the *tympanum*,

which moves the bones in the *tympanum* : these move the internal air, which finally communicates the motion to the auditory nerve, in the labyrinth and cochlea ; and according as the vibrations are quick or slow, the sound is either acute or grave.

The curious structure of the labyrinth and cochlea, serves to make the weakest sounds audible ; for the whole organ of hearing being included in a small space, the impression would have been made only on a very small part of it, had the auditory nerve run in a straight line ; and the strength of the impression being, *cæteris paribus*, always as the number of parts upon which the impression is made, those sounds which are now low, could not have been heard at all. If, like the retina, the auditory nerve had been expanded into a large web, that had covered or lined some wide cavity, even in this case the impression of sounds had been much weaker than they are now : for this large cavity would have given room for the sounds to dilate, and all sounds grow weaker in proportion as they dilate : but in the present structure of the labyrinth and cochlea, both these inconveniencies are prevented ; the canals of which, by their winding, contain large portions of the auditory nerve ; upon every point of which, the smallest sound being once impressed, becomes audible ; the sounds are hindered from dilating, by their narrowness ; and the impressions that are made upon the nerves, by the first dilatation, are ever the strongest. In like manner, the strength of the impression is increased in the narrow canals, by means of the elasticity of the sides of the bony-canal ; which receiving the first and strongest impulses of the air, reverberate them the more strongly upon the auditory nerve.

It deserves observation, that though the air be the usual matter of sounds ; so that if a bell be hung in *vacuo*, it will not be heard at all ; yet most other bodies, properly disposed, will do its office, only some more faintly than others. Thus a sound may be heard through water, or even through earth, of which there are various instances.

As the sight is assisted by spectacles, or other glasses, so the hearing is enlivened and rendered quick, by means of acoustic instruments ; which are of various figures, but for the most part bear some resemblance to a trumpet, diverging and growing wider towards the external mouth,

mouth, marked B B, (plate CXXVII. fig. 3. n° 1) the slender part A being introduced into the ear. But besides this common kind, those represented *ibid.* n° 2 and 3, are highly commended; but especially the third one, which by reason of its smallness, and form, being wreathed up like a spiral shell, may be so concealed under one's hair or wig, as scarce to be observable; whilst the slender part A is introduced into the ear, and the cords B B tied round it.

However, it is to be observed, that the simple kind almost in the shape of a horn, (*ibid.* n° 1.) and made either of brass, silver, &c. is the best instrument hitherto invented for assisting the hearing.

**Dulness of HEARING.** See the articles **DEAFNESS** and **EAR**.

Some recommend the following medicine for dulness of hearing: Take essence of amber, a dram; castor and oil of chamæmyle, of each half a scruple; and oil of amber, one drop: mix them all together, and three or four times a day put a piece of cotton, wetted in the mixture, into the ear.

The drinking of mineral waters every spring in a regular manner, is also recommended as a preservative from this disorder.

**HEARSE**, among sportsmen, a hind of the second year of her age. See **HIND**.

**HEART**, *cor*, in anatomy, a muscular body, included in the pericardium, and situated nearly in the middle of the breast, between the lobes of the lungs; being the primary organ of the circulation of the blood, and consequently of life.

Its figure is nearly conic, the larger end being called its base, and the smaller end its apex. Its lower part is plane, and the upper part convex. Its situation is nearly transverse, or horizontal; so that its base is in the right, and its apex, with the greatest part of its bulk, is in the left side of the thorax; and consequently, it is there that the pulsation is felt.

The plane surface of the heart lies on the diaphragm; the convex one is turned upwards. The heart is connected, 1st, by the intervention of the pericardium with the mediastinum, and with a large part of the middle of the diaphragm: this is contrived by nature, to prevent its being displaced, inverted, or turned too rudely about, in consequence of the various motions of the body. 2. Its base is connected to its common vessels; but

its apex is free, and is received into a kind of cavity in the left lobe of the lungs.

The length of the human heart is about six fingers breadth: its breadth at the base, is about five fingers; and its circumference about thirteen. It is, both externally and internally, surrounded with a smooth membrane. There is a quantity of fat about it, which covers its base and its apex, and serves for lubricating it, and for facilitating its motions. Its blood-vessels are of two kinds, common and proper; its common or peculiar vessels being the coronary arteries and veins.

The common vessels of the heart are two veins, called the vena cava, and the vena pulmonalis; and two arteries, the pulmonary one and aorta. The nerves of the heart are small, and arise from the par vagum and intercostals. The auricles are two. See **VEIN**, **ARTERY**, &c.

There are also two cavities in the heart, called its ventricles: of these the right is thinner and weaker in its circumference, but usually much more capacious than the left: it receives the blood from the vena cava, and the right auricle, and deliver it into the pulmonary artery, to be carried to the lungs. The left ventricle is much stronger and thicker in its sides; but it is narrower and smaller than the right: it receives the blood from the pulmonary vein, and the left auricle, and extrudes it very forcibly into the aorta. The right ventricle is in the anterior part of the thorax; the left in the hinder part: so that they might be called the anterior and posterior ventricles, much more properly than the right and left. See **CIRCULATION**.

There are in the sides of both the ventricles of the heart, and of both its auricles, several columnæ carneæ, or lacertuli, with furrows between them, seeming so many small and distinct muscles; and from the concurrence of the tendinous fibres of these in the heart, there are formed peculiar membranes situated at the orifices of the auricles of the heart: and there are also other columns of this kind, which run transversely from one side of the ventricles to the other: these serve partly to assist the contraction of the heart in its systole, and partly to prevent its too great dilatation in its diastole. See the article **SYSTOLE** and **DIASTOLE**.

The valvulæ of the heart are of three kinds. 1. The tricuspidales; these are three

Fig. 1. The H A R E .

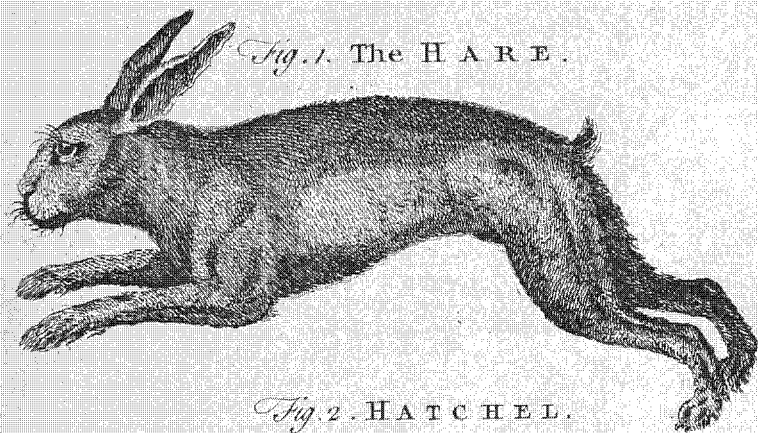


Fig. 2. H A T C H E L .



Fig. 3. H E A R I N G .

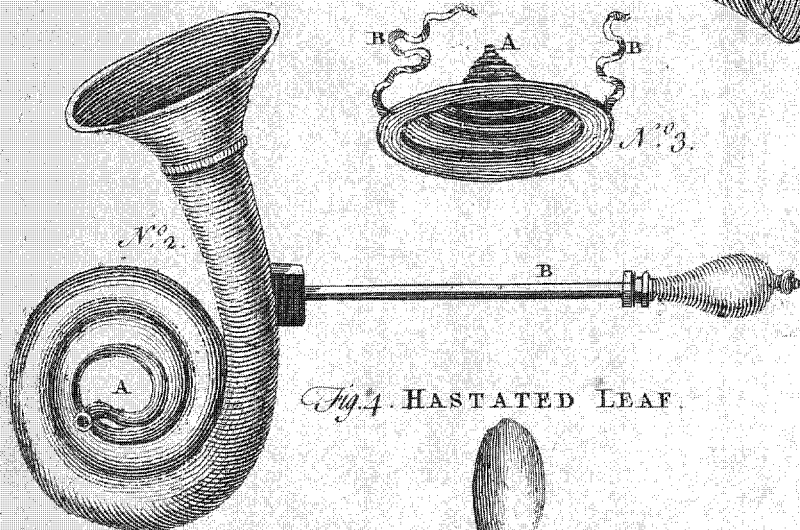
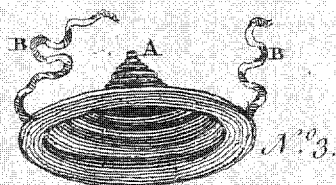
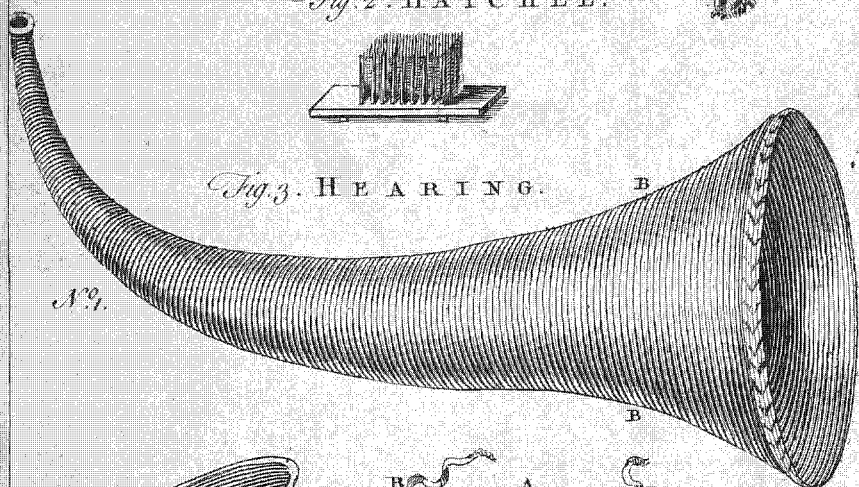
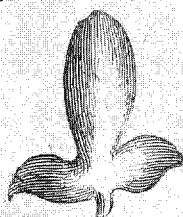


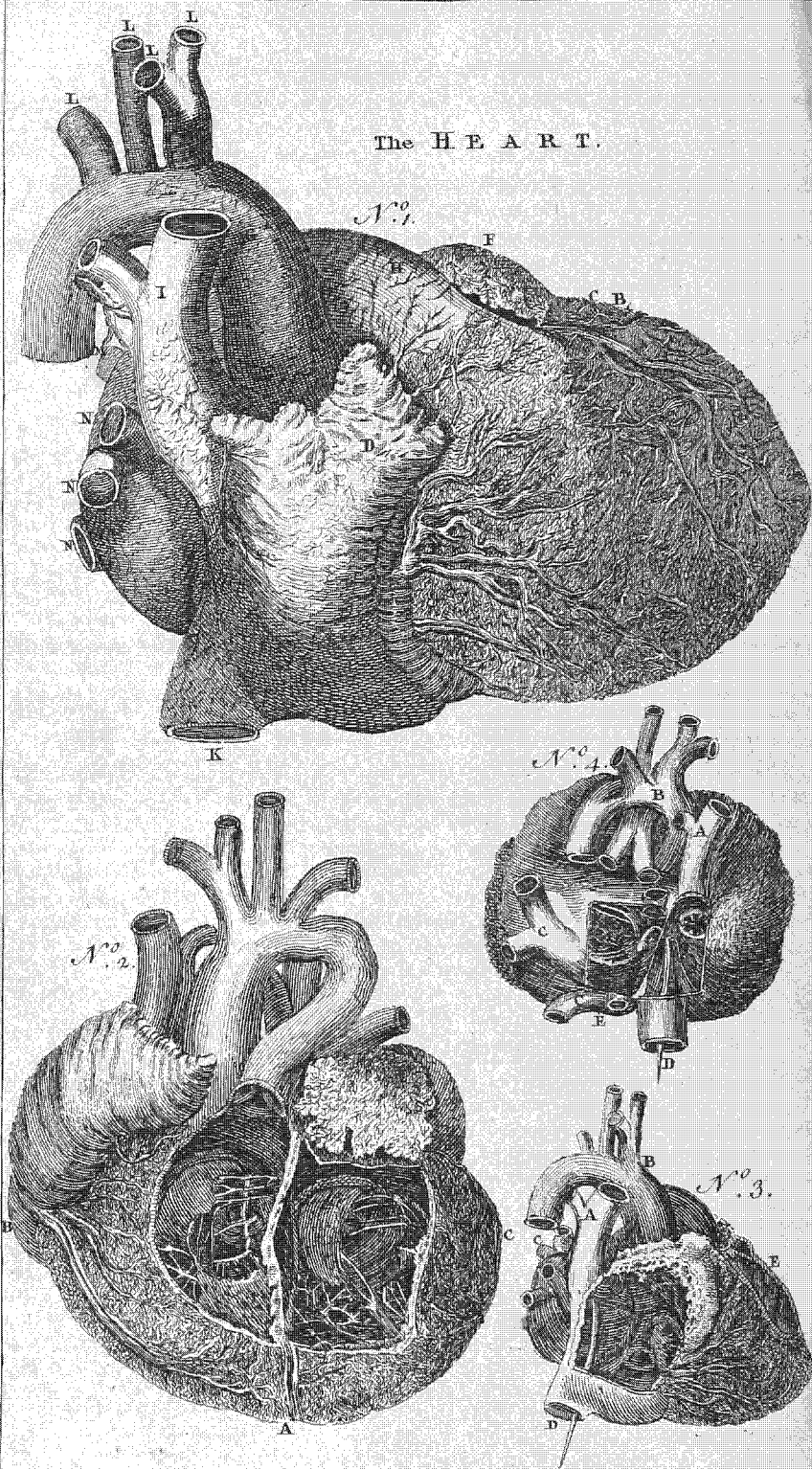
Fig. 4. H A S T A T E D L E A F .







The H E A R T.





three in number, and are situated at the ingress of the vena cava in the right ventricle. 2. The mitrales : these are two, and are situated in the left ventricle at the ingress of the pulmonary vein : these serve to hinder the ingress of the blood from the heart into the veins again, while they are constricted. 3. The semilunar ones : these are three, and are situated at the origin of the aorta and pulmonary artery, and serve to prevent the reflux of the blood from them into the heart : these, for the sake of strength, are furnished with a number of fleshy fibres and spheroid corpuscles.

The orifices of the veins of Thebesius and Verheyen, in the hollows of the heart, are for carrying back the blood from the substance of the heart to its cavities.

The fibres of the heart are of a muscular substance, and of a most amazing fabric. They are of two kinds, 1. Straight ones in the left ventricle ; and, 2. Spiral ones, common to both ventricles, and of two orders. The exterior ones run to the left, from the base of the heart : the interior ones run to the right, and intersect the others ; and, when they act, they closely constrict the cavities of the heart, and drive out the blood from them. According to this fabric, the heart may be resolved into two muscles, each of which constitutes one of its ventricles. The use of the heart, is for the circulation of the blood. It receives the blood from the veins, running from all parts of the body ; and propels it again, by its own motion, to all those parts, through the arteries. On this depend life itself, the preservation of the frame, and the motions and actions of all its parts. See the article *CIRCULATION of the Blood*.

This motion of the heart is wonderful : it continues to the utmost period of life, day and night, without a single moment's interruption or intermission ; and is performed more than an hundred thousand times every day. Here is, indeed, something like what the mechanists want, under the name of a perpetual motion ; and the stupendous wisdom of the creator is, in nothing, expressed more gloriously.

But that the reader may have as distinct an idea as possible of this primary organ of life, we shall lay before him several views of it. That exhibited in plate CXXVIII, n° 1. represents the human heart seen in its convex part, and in its natural situation ; where B marks the branches of the coronary vein ; C, the coronary

artery ; D, the right auricle ; E, branches of veins going from the right auricle ; G, the trunk of the aorta ; H, the trunk of the pulmonary artery ; I, the ascending trunk of the vena cava ; K, the descending trunk of the vena cava ; L, L, &c. branches of the aorta, rising upwards ; M, one of the branches of the pulmonary artery ; N, N, &c. branches of the pulmonary vein. No 2. *ibid.* represents the heart opened, to shew the structure and form of its ventricles ; where A expresses the muscular septum, or partition, which divides the ventricles ; B, the right ventricle opening into the right auricle, and into the trunk of the pulmonary artery ; C, the left ventricle, opening into the left auricle, and into the great trunk of the aorta. No 3 and n° 4, *ibid.* represent the heart in different positions ; where A marks the ascending trunk of the vena cava ; B the trunk of the aorta, C branches of the pulmonary vein, D the descending trunk of the vena cava, and E part of the right auricle, cut away, to shew the different arrangement of the internal fibres and venous ducts.

*Force of the HEART.* Several ingenious persons have, from time to time, attempted to make estimates of the force of the blood in the heart and arteries ; who have as widely differed from each other, as they have from the truth, for want of a sufficient number of data to argue from. This set the truly ingenious Dr. Hales upon making proper experiments, in order to ascertain the force of the blood in the veins and arteries of several animals.

If, according to Dr. Keil's estimate, the left ventricle of a man's heart throw out in each systole an ounce, or 1. 638 cubic inch of blood, and the area of the orifice of the aorta be = 0.4187 ; then dividing the former by this, the quotient 3.9 is the length of the cylinder of blood, which is formed in passing thro' the aorta in each systole of the ventricle ; and in the seventy-five pulses of a minute, a cylinder of 292.5 inches in length will pass : this is at the rate of 1462 feet in an hour. But the systole of the heart being performed in one third of this time, the velocity of the blood in that instant will be thrice as much, *viz.* at the rate of 4386 feet in an hour, or 73 feet in a minute. And if the ventricle throws out one ounce in a pulse ; then in the seventy-five pulses of a minute,

the

the quantity of blood will be equal to 4.4 lb 11 oz. and in thirty-four minutes a quantity equal to a middle-sized man, *viz.* 158 lb. will pass through the heart. But if, with Dr. Harvey, and Dr. Lower, we suppose two ounces of blood, that is, 3.276 cubic inches to be thrown out at each systole of the ventricle, then the velocity of the blood in entering the orifice of the aorta, will be double the former, *viz.* at the rate of 146 feet in a minute, and a quantity of blood equal to the weight of a man's body will pass in half the time, *viz.* 17 minutes. If we suppose, what is probable, that the blood would rise  $7 + \frac{1}{2}$  feet high in a tube fixed to the carotide artery of a man, and that the inward area of the left ventricle of his heart, is equal to fifteen

square inches; these multiplied into  $7 + \frac{1}{2}$  feet give 1350 cubic inches of blood, which presses on that ventricle, when first it begins to contract, a weight equal to 51.5 pounds.

What the doctor thus calculates, from supposition, with regard to mankind, he actually experimented upon horses, dogs, fallow does, &c. by fixing tubes, in orifices opened in their veins and arteries; by observing the several heights, to which the blood rose in these tubes, as they lay on the ground; and by measuring the capacities of the ventricles of the heart, and orifices of the arteries. And that the reader may the more readily compare the said estimates together, he has given a table of them, ranged in the following order.

The several animals.			
		Pounds. Ounces.	Weight of each.
Man	160	On	Height of the blood in the tube from the ju- gular vein.
Horse 1st.	825	112	Feet. Inches.
2d.	529	6	Height of the blood in tubes fixed to arteries.
3d.	10	1.659	Cubic inches.
Ox	1600	1.318	Capacity of the left ventricle of the heart.
Sheep	91	5 $\frac{1}{2}$	Square inches.
Doe	9	6 $\frac{5}{8}$	Area of the orifice of the aorta.
Dogs 1st.	52	0	Feet and in- ches in a minute.
2d.	24	5	Minutes.
3d.	18	5	Quantities of blood e- qual to the wt. of the animal in what time.
4th.	12	8	Pounds.
	4		How much in a minute
			Pounds.
			Weight of the blood sustained by the left ventricle contracting.
			Nº of pulses in a minute
			Square inches.
			Area of tran/v. section of descending aorta.
			Square inches.
			Area of the transverse section of ascending aorta.

Dr. Jurin likewise deduces the force of the heart from the laws of hydraulics, in the following manner. He supposes  $p$  = to the weight of the left ventricle, or a quantity of blood equal to the same weight;  $S$  = the internal surface of the same;  $l$  = the mean length of the filaments of blood issuing from the same;  $s$  = the section of the aorta;  $q$  = the quantity of blood contained in the left ventricle;  $t$  = the time in which the blood would be expelled from the heart, taking away the resistance of the arteries, and of the blood going before;  $v$  = the variable velocity with which the blood issuing from the heart would flow thro' the aorta, abstracting from the resistance;  $x$  = the variable length of the aorta, described by the blood gushing from the heart;  $z$  = the time in which the length  $x$  is described. Hence the mean variable velocity, of the blood contiguous to the ventricle, or the mean velocity of the ventricle itself, is  $= \frac{sv}{S}$ ; the motion of

the ventricle  $= p \times \frac{sv}{S}$ ; the motion of

the issuing of the blood  $= sv \times l + x$ ; the sum of these, or the power of the

ventricle  $= sv \times \frac{p}{S} + l + x$ . But it is

$v = \frac{\dot{x}}{z}$ . Whence by Newton's inverse method of fluxions, the power of the

ventricle will be found  $\frac{sx}{z} \times \frac{p}{S} + \frac{x}{z} + l$ .

Now, since  $z = t$ , it will be  $sx = q$ . Hence the power of the ventricle  $=$

$\frac{q}{t} \times \frac{p}{S} + \frac{q}{2s} + l$ . In the same manner the power of the right ventricle will be found

$= \frac{q}{t} \times \frac{p}{S} + \frac{q}{2s} + l$ . Here the same things

are signified by the greek letters in the right ventricle, as by the italic letters in the left. Hence the whole power of the

heart  $= \frac{q}{t} \times \frac{p}{S} + \frac{q}{2s} + \frac{q}{2s} + l + \lambda$ . Q.

E. I.

If we suppose  $p$  = 8 ounces avoirdupois = 13.128 cubic inches;  $\pi$  = 4 = 6.564;  $S$  = 10 square inches;  $z$  = 10;  $l$  = 2 inches;  $\lambda$  = 1.5;  $q$  = 2 ounces avoirdupois = 3.282 cubic inches;  $s$  = 0.4185 square inches;  $\sigma$  = 0.583;  $t$  = 0.1". The power of the ventricles will be equal to the motion of the underwritten weights,

that is,

Of the left ventricle

Of the right ventricle

Of the whole heart

lb oz.

9 1

6 3

15 4

Of which weights the velocity will be such, as that a line of an inch long might be described by the same in a second.

*Weight, &c. of the HEARTS of children, compared with those of grown persons.*

Dr. Bryan Robinson has made several useful observations on this subject, which are as follow.

1. The weight of the heart with respect to the weight of the body, is greater in children than in grown persons, in proportion of 3 to 2. Hence the weight of the heart, with respect to the weight of the body, lessens continually from the birth, till the bodies come to their full growth.

2. The quantity of blood which flows through the heart or lungs in a given time, in proportion to the weight of the heart, or quantity of blood contained in the body, which quantity of blood is proportional to the weight of the heart, is greater in children than in grown bodies, in the proportion of 20 to 7; which is the proportion of their pulses in a minute. Hence, the quantity of blood that flows through the heart or lungs in a given time, in proportion to the whole quantity of blood contained in the body, lessens continually from the birth, till bodies arrive at their full growth.

3. The velocity of the blood with respect to its quantity, which quantity is as the weight of the heart, is much greater in children, than in grown persons, in the proportion of 80 to 7. Hence, tho' the blood of children moves slower than the blood of grown people; yet for its quantity, it moves much quicker, and passes much oftner thro' the lungs. On which account the blood of children, notwithstanding the slowness of its motion, may by passing oftner through the lungs, and thereby receiving more of the acid of the air, in proportion to its quantity, be more fluid, and of a brighter colour, than the blood of grown persons.

4. The quantity of blood that flows through the heart or lungs in a given time, in proportion to the weight of the body, is greater in children than in grown bodies, in the proportion of 30 to 7. Hence, though the velocity of the blood is less in children than in grown bodies, yet its motion with

respect to the weight of the body is greater.

5. The velocity of the blood with respect to the length of body, is greater in children than in grown bodies, in the proportion of 20 to 7, which is the proportion of their pulses in a minute. Hence the velocity of the blood and number of pulses in a minute, with respect to the length of the body, lessen continually in growing persons, till they arrive at their full growth.

**HEAT**, in physiology, one of the secondary qualities of bodies, produced by fire, and opposed to cold. See **COLD**.

Under the article fire, we considered the sun as the principal source of heat upon the earth's surface, and the confines of the earth and atmosphere: without this, all the bodies upon our globe would doubtless grow rigid, lifeless, and fixed. It is this that stirs within them, as the main spring of their actions. Hence vegetation and animalization are evidently promoted; and hence the ocean and the atmosphere continue in a fluid state. See **VEGETATION**.

Heat in us is properly a sensation, excited by the action of fire; or it is the effect of fire on our organs of feeling. See **FIRE**.

Hence it follows, that what we call heat is a particular idea or modification of our own mind, and not any thing existing in that form in the body that occasions it. Heat, says Mr. Locke, is no more in the fire that burns the finger, than pain is in the needle that pricks it. In effect, heat in the body that gives it, is only motion; and in the mind, only a particular idea or disposition of the soul.

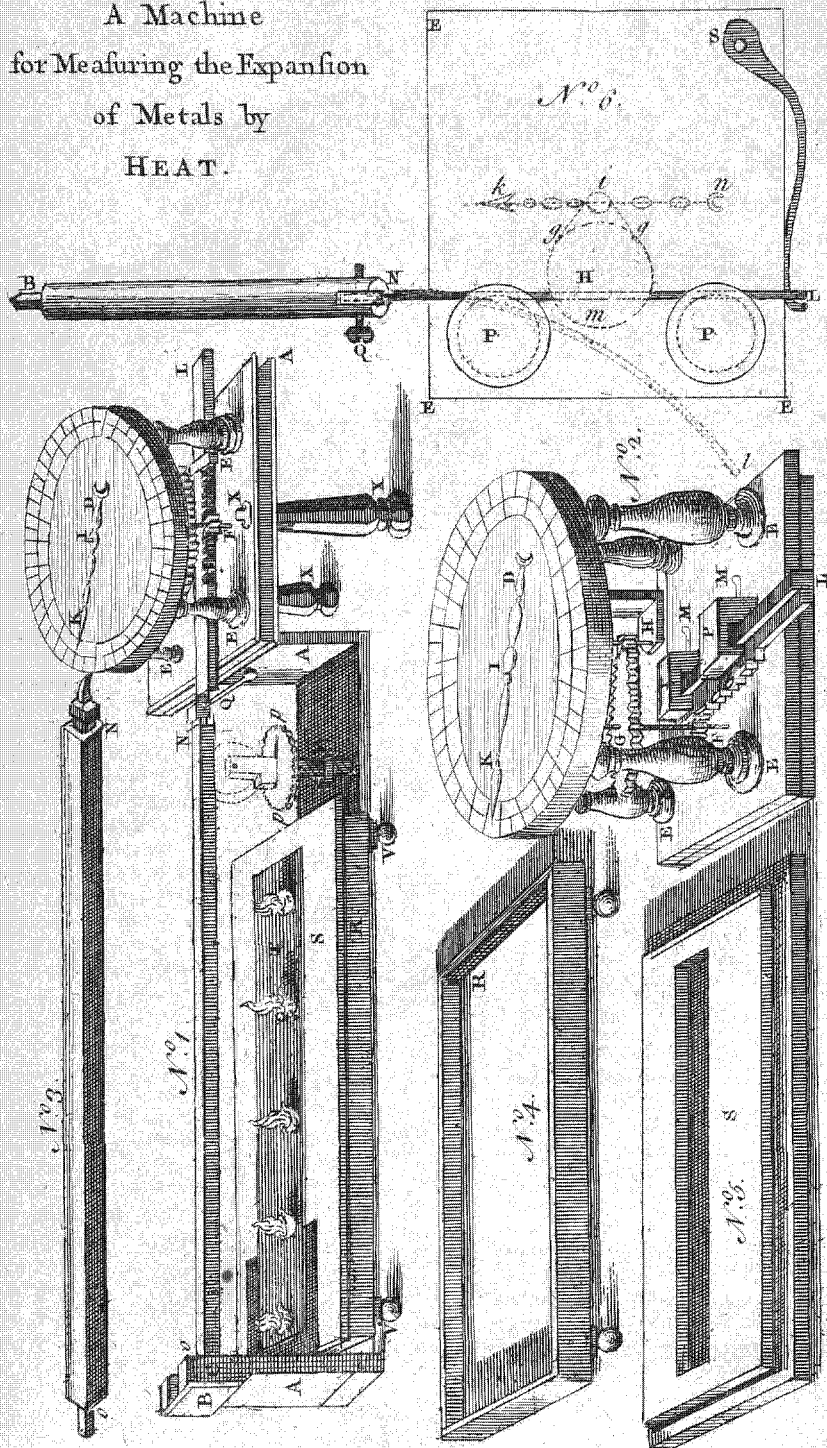
Heat in the hot body, according to 'S. Gravesande, is an agitation of the parts of the body, made by means of the fire contained in it: by such an agitation a motion is produced in our bodies, which excites the idea of heat in our mind; so that heat in respect of us is nothing but that idea, and in the hot body nothing but motion. If such motion expel the fire in right lines, it gives us the idea of light; if in a various and irregular motion, only heat. See **LIGHT**.

Heat, with respect to our sensations, or the effect produced on us by a hot body, is estimated by its relation to the organ of feeling; no object appearing to be hot, unless its heat exceed that of our body. Whence the same thing to different persons, or, at different times, to the same person, shall appear both hot

and cold. The degree of heat is measured by the expansion of the air, or spirit in the thermometer. See **THERMOMETER**. Under the article fire, we considered, among the several other properties of heat, its quality of expanding and dilating bodies. It is found to expand metals considerably, as appears from an experiment of Muschenbroek; the effects of which experiment are digested in a table, which having the degrees of expansion marked in equal parts to the  $\frac{1}{12500}$  part of an inch, we have given under the article **EXPANSION**.

The ingenious Muschenbroek contrived a machine for measuring the least alteration of dimensions in metals by heat, the description of which is this: plate CXXVI. n<sup>o</sup> 1. represents the whole machine with all its parts together, as it is used. At one end of this is a brass machine, LE, &c. which for the better shewing its parts is delineated, (*ibid.* n<sup>o</sup> 2.) as seen from another side. D is a circular plate  $2\frac{1}{10}$  inches diameter, the circumference of which is divided into degrees: this plate stands upon four pillars EEEE, which join it to the lower brass plate; and between the two plates, there is a perpendicular steel-arbor or axis F, which has on its lower part a pinion of six leaves or teeth, and on its upper end a wheel of sixty teeth, marked G: there is also another axis IH, supported by a cock H, which comes down from the upper plate; serving to turn the index IK, and having at its lower end a pinion of six leaves to take the teeth of the wheel G, by one turn of which wheel the index is carried round all the divisions: L is a rack, or straight piece of metal with teeth, which take the leaves of the pinion F, while it slides along under two small cocks PP; being pressed towards the pinion F by means of two screws, M, M; or drawn from it as there is occasion: there are twenty-five teeth in each inch of this piece; and as it moves forward and backward, the pinion F is carried round, and consequently the wheel G, which carries round the pinion H; together with the index IK. Let us suppose the rack to have run the length of an inch, then F and G will have turned round  $4\frac{1}{2}$  times; and consequently, the pinion H will have gone round  $10 \times 4\frac{1}{2} = 41\frac{1}{2}$  time, because H turns round ten times for G once: so that the index IK will have moved round

A Machine  
for Measuring the Expansion  
of Metals by  
HEAT.





round  $41\frac{2}{3}$  times, or 12500 degrees; therefore, when the index goes but from one degree to another, the rack L moves but the 12500th part of an inch; and as the motion of the index over half a degree is very sensible, we may perceive when the rack has moved  $\frac{1}{25000}$  part of an inch.

N<sup>o</sup> 3, *ibid.* represents a square bar of metal, upon which the experiment is made,  $5\frac{8}{10}$  inches long, and  $\frac{3}{8}$  of an inch thick. Its end O has a small tail, that it may communicate no heat to the iron plate A, into which it is received at B (*ibid.* n<sup>o</sup> 1.) and fixed by a screw C. Its other end N has a hole in it, thro' which goes the screw Q, that makes it fast to the rack L.

The bar being thus fixed, cannot become longer without pushing forward the rack L, and thereby moving round the index IK, by means of the wheel and pinions F, G, H; so likewise when it grows shorter, they must move the contrary way.

Now in order to apply the heat of burning spirits, there is a box, R, made of brass (*ibid.* n<sup>o</sup> 4.)  $3\frac{1}{2}$  inches long,  $1\frac{2}{10}$  inch wide, and  $\frac{4}{10}$  inch deep; which is covered at top with a piece of stone, S, represented in n<sup>o</sup> 5. with the under-side uppermost, the use of which is, to prevent the spirits from taking fire. It has a long hole cut thro' the middle, into which is set a brass plate T, (*ibid.* n<sup>o</sup> 1.) with five small equidistant holes, to transmit so many wicks of fine cotton; which being lighted, one or more at a time, cause the bar to expand, and the degree whereof is shewn by the index.

N<sup>o</sup> 6. represents the lower frame with Dr. Defaguliers's alterations, where BN is the round rod of metal to be tried with the steel-plate made fast at N by the pin Q. This plate, the natural situation of which is NL, is here kept straight in the position NL, by means of the spring SL; and is directed by the grooves of the pulleys PP, so that its upper-side presses on the roller H. The dotted circles *m*gg, represents the wheel above on the axis of H; and *g*ig, the watch-chain, carrying round the last roller i, an index *nik*, as in n<sup>o</sup> 1.

It has been justly observed by some of our modern philosophers, that actual or absolute heat, is to sensible or relative heat, the same as motion is to velocity: for absolute heat is nothing but the whole

motion of all the parts of the ignited body; and sensible, or relative heat, respects only the comparative velocity of the parts. Thus, equal bulks of mercury and water set in a sand-heat, where the heat of the fire may be uniformly communicated to both, will acquire in equal times equal degrees of absolute heat: but the relative heat of the water, or that which is sensible to the finger will be near 14 times as great as that of the mercury, because the water, having 14 times a less quantity of matter, will admit of velocity so much in proportion greater.

Again, if mercury and water have the same relative or sensible heat, that is, if both are heated in such a manner as to cause an equal ascent in the thermometer, then a quantity of mercury will heat 14 times as much water as the same quantity of water will do; or it will make the same quantity of cold water 14 times hotter than the same quantity of hot water can. All which is easy to be shewn by experiment, and abundantly proves, that heat and fire are wholly owing to the velocity of the parts of the heated or ardent body: on which theory the various phenomena of heat, cold, fire, burning, &c. are rationally accounted for. For first we are to consider, that cold and heat are only comparative terms, or that the same thing may either be too hot, or too cold, according to the relative idea or standard-degree. Thus ice or snow, is said to be cold with respect to the finger, but ice or snow is warm if compared to a freezing mixture, so that if (as we commonly do) we make the hand or any part of the body the standard of heat and cold, or the term of comparison, then it is evident, 1. If the parts of any body applied to the hand have the same velocity as the parts of the hand, such a body we naturally pronounce is neither hot nor cold. 2. If the particles of the body have a greater velocity than those of the hand, we pronounce it warm, if the excess be small; but hot, if it be great. 3. If the velocity of the parts of the body applied be less than that in the hand, the sensation then is what we call cold, which also may be in various degrees. 4. Hence it is plain there can be no such thing as absolute cold, but where the particles of matter are absolutely quiescent, or at rest. 5. Hence also, there can be no such thing as absolute heat, because no degree of

velocity can be assigned but a greater is still assignable, till we come to infinity ; where we are quite lost, as having no idea of infinite velocity or heat.

From this theory of heat and cold, we may conclude, that there is no body in nature whose parts are not in motion, in some degree, since we have yet been able to discover no ultimate degree or limit of cold ; and if any such thing were to be found in nature, it is likely, that it would be as impossible to bear or endure the test, as any extreme degree of heat ; both heat and cold naturally tending to destroy the animated part, or test, in the extreme degrees : cold, by destroying the vital motion, and fixing the part rigid and inflexible ; but heat, by putting the parts into too great an agitation, causing a greater velocity of the fluids and dissipation, and a force of tension in the solids, beyond what the natural state of the body can bear ; and therefore it will inevitably destroy it.

*Kinds, degrees, directions, &c. of HEAT, in chemistry, &c.* See the article FIRE.

**HEAT**, in geography. The earth being farther removed from the sun in summer than in winter, as was shewn under the article EARTH, it may be asked, how it comes to pass, that since the sun is the fountain of heat as well as light, our winters are much colder than our summers. In answer to this, it is to be considered that the rays of the sun fall with much less obliquity upon the surface of the earth, on our side of the equator in the summer, than in the winter ; and therefore they not only act more forcibly upon it, but a greater quantity of them fall upon a given place. For it is shewn in mechanics, that a moving body, striking perpendicularly on another, acts on it with all its force, and that a body striking obliquely, acts with the less force, the more it deviates from the perpendicular. Now fire, moving in right lines, must observe the same mechanical law as other bodies ; and consequently its action must be measured by the angle of incidence ; and hence fire striking on any obstacle in a direction parallel thereto, has no sensible effect, by reason the ratio is almost infinite, *i. e.* nothing : hence the sun radiating on the earth in the morning scarce produces any warmth at all. Again, in the winter, besides that the sun is much lower in the heaven when at its meridian height, than in the sum-

mer, it's rays pass through a longer portion of the earth's atmosphere, by which great part are intercepted, and some by various refractions and reflections, turned another way. See the article ATMOSPHERE.

And lastly, in summer, the sun continues with us sixteen hours, and is absent but eight, whereas in winter it is with us but eight hours, and is absent sixteen, all which things conspire to make a considerable alteration with respect to heat and cold.

If this be so, why is not the weather hotter, when the sun is in the tropic of cancer, its rays then falling with the least obliquity, and passing the shortest way through the atmosphere, and the days being then at the longest, than it is about a month afterwards, when the sun is in the next sign ? In answer to this, it is to be remembered that bodies are not always the hottest at that very instant the greatest degree of heat is applied to them : they require time to heat, as well as to cool ; it is the length of time therefore that the heat is applied to them, as well as the degree of it, that determines the quantity of heat communicated to them. For the like reason we find it warmer about two o'clock in the afternoon, than at twelve, when the sun is in its meridian altitude, and its rays fall thickest and most forcibly upon the earth.

The diversity of the heat of climates and seasons arising chiefly from the different angles under which the sun's rays strike upon the surface of the earth, Dr. Halley gives a mathematical computation of the effect of the sun under the different seasons and climates, going upon the mechanical principle already laid down : whence the vertical ray which is of the greatest heat being put for radius, the force of the sun on the horizontal surface of the earth will be to that as the sine of the sun's altitude at any other time : but how strictly just this calculation may be, for reasons already assigned, and from the following considerations, we wholly leave to the sagacity of our readers to determine. Let it be considered, that the different degrees of heat and cold in different places depend in a very great measure upon the accidents of situation, with regard to mountains and vallies, and the soil. The first greatly helps to chill the air by the winds which come



come over them, and which blow in eddies thro' the levels beyond ; and mountains, sometimes turning a concave side to the sun, have the effects of a burning mirror upon the subject plain ; and the like effects is sometimes had from the convex parts of clouds, either by refraction or reflection. As to soils, a stony, sandy, or chalky earth, it is known, reflects most of the sun's rays into the air again, and retains but few, by which means a considerable accession of heat is derived to the air ; as, on the contrary, black, loose soils absorb most of the rays, and return few into the air, so that the ground is much the hotter.

The following table of the heat of different climates is computed for every tenth degree of latitude, to the equinoctial and tropical sun ; by which an estimate may be made of the intermediate degrees.

Lat.	Sun in ☐	Sun in ☐	Sun ☐
0	20000	18341	18341
10	19696	20290	15854
20	18797	21737	13166
30	17321	22651	10124
40	15321	23048	6944
50	12855	22991	3798
60	10000	22773	1075
70	6840	23543	000
80	3473	24673	000
90	0000	25055	000

Hence are deducible the following corollaries. 1. That the equinoctial heat, when the sun becomes vertical, is as twice the square of the radius, which may be proposed as a standard to compare with in all other cases. 2. That under the equinoctial, the heat is as the sine of the sun's declination. 3. That in the frigid zones, where the sun sets not, the heat is as the circumference of a circle into the sine of the altitude at 6 ; and consequently that in the same latitude these aggregates of warmth are as the sine of the sun's declination ; and at the same declination of the sun, they are as the sines of the latitudes into the sines of the declination. 4. That the equinoctial day's heat is every where as the cosine of the latitude. 5. In all places where the sun sets, the difference between the summer and winter-heats, when the declinations are contrary, is equal to a circle into the sine of the altitude at 6 in the summer parallel ; and consequently these differ-

ences are as the sine of the latitude into or multiplied by the sines of declination. 6. From the foregoing table, it appears that the tropical sun under the equinoctial, has of all others the least force. Under the pole, it is greater than any other day's heat whatever ; being to that of the equinoctial as 5 to 4.

From the table and these corollaries, a general idea may be conceived of the sum of all the actions of the sun in the whole year ; and thus that part of heat which ariseth simply from the presence of the sun, may be brought to a geometrical certainty. The heat of the sun for any small portion of time is always as a rect-angle contained under the sine of the angle of incidence of the rays producing heat at that time.

Heat is usually divided by the school philosophers into actual and potential ; the former of which is that hitherto treated of, and the latter that which we find in pepper, wine, and certain chemical preparations, as of oil of turpentine, brandy, quick-lime, &c.

The peripatetics account for the heat of quick-lime from an antiperistasis. The epicureans, and other corpuscularians, attribute even potential heat to atoms, or particles of fire detained and locked up in the pores of these bodies, and remaining at rest therein, which being excited to action again by the heat and moisture of the mouth, or by the effusion of cold water, or the like cause, then break their inclosures, and discover what they are.

In the memoirs of the french academy, for the year 1713, the reader may find this doctrine well illustrated by M. Lemery, the younger, in the instances of quick-lime, regulus of antimony, tin, &c. which account Mr. Boyle endeavours to set aside, and substitute a mechanical property, viz. a peculiar texture of parts in these cases in lieu of fire. See Boyle's Mechanical Origin of Heat and Cold.

HEAT, in the animal œconomy, known by the several names of natural heat, vital heat, innate heat, and animal heat, is commonly supposed to be that generated by the attrition of the parts of the blood, occasioned by its circulatory motion, especially in the arteries.

To what organs, or operations, the heat of the human body, and other animal bodies, is owing, is hitherto extremely doubtful. The opinions that at present prevail

prevail are, 1. That the heat of animal bodies is owing to the attrition betwixt the arteries and the blood. 2. That the lungs are the fountain of this heat. 3. That the attrition of the parts of the solids on one another produce it. 4. That it is owing to the mechanical attrition of the particles of our fluids. To which opinions Dr. Stevenson of Edinburgh, adds a 5, *viz.* That whole process by which our aliment and juices are constantly undergoing some alteration.

The reasonings in favour of these several opinions may be seen at large, as laid down by the above-mentioned author in an essay on the cause of animal heat, in the Medical Essays, vol. vi. The chief arguments in favour of the first opinion, are, that if an artery is tied, or cut, the part to which it goes, turns cold; and on the ceasing of the pulsation of the arteries, cold and death follow. An increase of heat attends a brisk circulation, and a languid circulation is accompanied with a small heat. One who burns in a fever, or is hot with exercise, has a full and frequent pulse. In cold faintings, chlorosis, &c. the pulse is small and slow. To these they add, that the thermometer shews the arterial blood to be a little hotter than that of the veins.

This is accounted for from the conical figure of the arteries, from their fluxes and branches into exquisitely small capillaries; whence the resistance, and consequently the attrition must be great, from the number, strength, and elasticity of their coats; from the propelling power of the heart, and their strong resistance. From all these it is inferred, that the particles of blood perpetually getting new motions, directions, and rotations, are attenuated, condensed, have their angles grinded off, and are made homogeneous: hence, it is said, follows the fluidity, red colour, and heat of the mass, which is here perfected. See the articles ARTERY, HEART, CIRCULATION, and BLOOD.

The second opinion is, that the lungs are the fountain of heat in the human body. All that has been said for the blood's being heated in the arteries, is advanced to prove this hypothesis, with considerable additions, *viz.* that in the lungs the blood vessels every where attend, divide, and subdivide, along with the ramifications of the wind-pipe, and

as these are perpetually changing their situation and form, becoming longer, or shorter, making more acute, or more obtuse angles, so must the concomitant blood-vessels every moment make new angles, and give the blood new directions; that at last it enters into an exquisitely fine net-work, spreads every where on the vastly thin air-vesicles, where these air-bladders are perpetually changing their angles, points of contact, their form, volume, interstices, and so forth. From these and the elasticity of the air, and weight of the atmosphere, the blood is said to be churned, pressed backward and forward, broken and kneaded together, dissolved and condensed, made red and hot in respiration.

The third opinion is, that the cause of the animal heat is owing to the action of the solid parts upon one another. The reason in support of this opinion, is, that the heart and arteries move most; thence that it is natural to think, that the heat should be owing to this motion.

The fourth opinion is, the mechanical attrition of the particles of the fluids upon one another. Dr. Stevenson observes, that those who support this hypothesis, must not only suppose that mechanical attrition begets heat, but begets itself without diminution; that they must not only shew what sets this attrition agoing, but what maintains it because all mechanical force perpetually decreases in a resisting medium; in short, that they must shew the possibility of a perpetuum mobile, the impossibility of which they themselves demonstrate.

The fifth opinion is, what Dr. Stevenson calls the animal process, or that process by which our aliment and fluids are perpetually undergoing some alteration. This process, according to that writer, may be one *sui generis*, somewhat of a middle nature betwixt fermentation and putrefaction; and he thinks it comes so near to the latter, that he chooses to call it by that name. In putrefaction, which is a most powerful dissolvent of bodies, the intestine action of their minute particles creates, collects, or some way or other is the cause or means of heat. The doctor thinks it probable that this process is constantly carried on in all our juices, especially where there is blood; and this is chiefly in the veins, so that the blood is both

both the fountain of heat and the first spring of motion.

The late Dr. Mortimer, in the *Philos. Trans.* n° 476. gives it as his opinion, that the heat of animals is explicable from the phosphorus and air they contain. Phosphorus exists, at least in a dormant state, in animal fluids; and it is also known, that they all contain air: it is therefore only necessary to bring the phosphoreal and aerial particles into contact, and heat must of consequence be generated.

**HEATH**, *erica*, in botany, a genus of the *ostandria-monogynia* class of plants, the flower of which consists of one erect and quadrifid petal; and its fruit is a quadrilocular capsule, containing a great number of very small seeds.

The distilled water of heath-flowers is recommended for sore eyes, as also for the colic; and fomentations of them are said to be good in the gout and paralytic cases. *Dale.*

**Berry-bearing-HEATH**, a name given to *empetrum*. See *EMPETRUM*.

**Mountain-HEATH**, the name by which some call *saxifrage*. See *SAXIFRAGE*.

**HEATH-HEN**, a name sometimes given to the grouse. See the article *GROUSE*.

**HEATH-MOSS**, *coralloides*, in botany. See the article *CORALLOIDES*.

**HEATHENS**, in matters of religion, the same with pagans. See *PAGANS*.

**HEAVING**, in the sea-language, signifies throwing any thing over-board. Also turning about the capstan, is called heaving at the capstan. Likewise, when a ship being at anchor, rises and falls by the force of the waves, she is said to heave and set.

**HEAVEN**, *cælum*, literally signifies the expanse of the firmament, surrounding our earth, and extended every way to an immense distance.

The Hebrews acknowledged three heavens: the first the aerial heaven, in which the birds fly, the winds blow, and the flowers are formed; the second, the firmament in which the stars are placed; the third, the heaven of heavens, the residence of the Almighty, and the abode of saints and angels.

Heaven is considered by christian divines and philosophers, as a place in some remote part of infinite space, in which the omnipresent Deity is said to afford a nearer and more immediate view of himself, and a more sensible manifestation of his glory, than in the other parts of the universe.

This is often called the empyrean, from that splendor with which it is supposed to be invested; and of this place the inspired writers give us the most noble and magnificent descriptions.

The pagans considered heaven as the residence only of the celestial gods, into which no mortals were admitted after death, unless they were deified. As for the souls of good men, they were consigned to the elysian fields. See the article *ELYSIAN FIELDS*.

**Crystalline HEAVENS**. See the article *CRYSTALLINE*.

**HEAVINESS**, in general, the same with weight or gravity. See *GRAVITY* and *WEIGHT*.

**HEAVINESS**, *gravedo*, in medicine. See the article *GRAVEDO*.

**HEAVY**, in the manege. A horse is said to rest heavy upon the hand, when, thro' the softness of his neck, the weakness of his back, and the weight of his fore-quarters, or through weariness, he throws himself upon the bridle, but without making any effort to escape the horseman's hand.

By stopping him, and making him frequently go back, you may make him light upon the hand; that is, if his heaviness proceeds from laziness and stiffness; but if it is occasioned by a defect in his back, there is no remedy for it.

**HEBDOMARY**, a solemnity of the ancient Greeks, in honour of Apollo, in which the Athenians sung hymns in honour of that god, and carried in their hands branches of laurel. The word signifies the seventh day, this solemnity being observed on the seventh day of every lunar month.

**HEBENSTRETIA**, in botany, a genus of the *didynamia-angiospermia* class of plants, the flower of which is monopetalous, with a cylindraceous tube shorter than the calyx, and quadrifid at the limb; the fruit is an oblong capsule, containing two oblong seeds, convex and furrowed on one side, and plane on the other.

**HEBRAISM**, an idiom or manner of speaking peculiar to the hebrew language. See the next article.

**HEBREW**, or **HEBREW LANGUAGE**, that spoken by the ancient Jews, and wherein the Old Testament is wrote.

This appears to be the most antient of all the languages in the world, at least we know of none older: and some learned men are of opinion, that this is the language in which God spoke to Adam in Paradise,

Paradise, and in which the saints will speak in heaven.

The books of the Old Testament are the only pieces to be found, in all antiquity, written in pure Hebrew; and the language of many of these is extremely sublime: it appears perfectly regular, and particularly so in its conjugations; indeed, properly speaking it has but one conjugation, but this is varied in each seven or eight different ways, which has the effect of so many different conjugations, and affords a great variety of expressions to represent by a single word the different modifications of a verb, and many ideas which in the modern, and in many of the antient and learned languages, cannot be expressed without a periphrasis.

The primitive words, which are called roots, have seldom more than three letters or two syllables.

In this language there are twenty-two letters, only five of which are usually reckoned vowels, which are the same with ours, *viz.* *a, e, i, o, u*; but then each vowel is divided into two, a long and a short, the sound of the former being somewhat grave and long, and that of the latter short and acute: it must however be remarked, that the two last vowels have sounds that differ in other respects besides quantity, and a greater or less elevation. To these ten or twelve vowels may be added others called semi-vowels, which serve to connect the consonants, and to make the easier transitions from one to another. The number of accents in this language are, indeed, prodigious: of these there are near forty, the use of some of which, notwithstanding all the enquiries of the learned, are not yet perfectly known. We know, in general, that they serve to distinguish the sentences like the points called commas, semicolons, &c. in our language; to determine the quantity of the syllables, and to mark the tone with which they are to be spoke or sung. It is no wonder then, that there are more accents in the hebrew than in other languages, since they perform the office of three different things, which in other languages are called by different names.

HEBREWS, or *Epistle to the HEBREWS*, a canonical book of the New Testament.

Though St. Paul did not prefix his name to this epistle, the concurrent testimony of the best authors, antient and modern, afford such evidence of his being the au-

thor of it, that the objections to the contrary are of little or no weight. His mentioning himself in it, as lately a prisoner in Italy, and his promise to visit the Hebrews, together with Timothy, who had been released from imprisonment, both denote the writer, and the time of his writing this epistle, that it was just after the deliverance of St. Paul from his first trial at Rome.

The Hebrews, to whom this epistle was wrote, were the believing Jews of Palestine, and its design was to convince them, and, by their means, all the jewish converts, wheresoever dispersed, of the insufficiency and abolishment of the ceremonial and ritual law. In order to which he undertakes to shew, first, the superior excellency of Christ's person above that of Moses: secondly, the superiority of Christ's priesthood above the levitical: thirdly, the mere figurative nature, and utter insufficiency of the legal ceremonies and sacrifices: and, fourthly, that to forsake the mosaical law, was not, as the Jews boldly asserted, to apostatize from God, but was their indispensible duty and obligation. These particulars are intermixed with proper inferences and exhortations, all tending to shew the jewish christians the unreasonableness, folly, and danger of relapsing into judaism.

HEBRIDES, islands on the west of Scotland, of which Sky, Mull, Isla, and Arran are some of the largest.

HECATOMB, among the antient pagans, was the sacrifice of an hundred bulls or oxen; or, in a less confined sense, an hundred animals of any sort.

Pythagoras is said to have sacrificed an hecatomb to the muses, through joy and gratitude for his having discovered the demonstration of the XLVIIth proposition in the first book of Euclid, *viz.* that, "In a rectangled triangle, the square of the hypothenuse is equal to the squares of the other two sides."

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HECATOMBÆON, *ἐκατομβαιων*, in antient chronology, the first month of the athenian year, consisting of thirty days, and answering to the latter part of our

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**HECATOMBÆON**, *ἑκατομβαιων*, in antient chronology, the first month of the athenian year, consisting of thirty days, and answering to the latter part of our June and beginning of July. It was so called on account of the many hecatombs sacrificed in it.

**HECK**, an engine to take fish in the river Ouse. A salmon heck is a grate for catching that sort of fish.

**HECKLE**. See the article **HATCHEL**.

**HECKLING** of *hemp* and *flax*. See the articles **HEMP** and **FLAX**.

**HECTIC**, or **HECTIC FEVER**, a kind of slow fever, occasioned by exulcerations of the lungs, and the purulent matter mixing with the blood, and disturbing its natural motion. The symptoms are an unusual heat in the palms of the hands, a redness of the cheeks, especially after eating; also a weak, but quick pulse, a languid habit of body, and loss of strength.

It is of the utmost consequence, says Dr. Mead, to attempt the cure of this dreadful disease early; and as it arises from inflammations, it requires repeated bleedings. Dr. Pringle recommends the same practice, with the use of setons and issues,

made in the side that is most affected. He observes, that he found nothing diminish the hectic fits so much as small but repeated bleedings, especially when saline draughts and a cooling diet are taken at the same time. In thirst, heat, and other symptoms, the signs of a putrid state of the humours, the ptisan is to be acidulated with the spirit of vitriol, and the aliments are to be chosen of the acefcent kind. A mixture of equal parts of barley-water and sweet milk, seasoned with sugar and nutmeg, makes a proper and an agreeable part of diet; and in case of costiveness, let the patient drink a decoction of bran with raisins and liquorice. Colliquative sweats are most safely checked by lime-water, whereof the patient may drink about a pint a day, softened with a little new milk.

A milk-course, though much recommended by physicians, as having the double advantage of being food and physic, ought to be taken with caution; not only because some people have a natural aversion to milk, but because in head-achs, acute fevers, flatulencies, bilious loosenesses, and bloody stools, it is found to be very prejudicial. The preference is generally given to asses-milk, as being most cooling and detergent; but when it can be conveniently had, whey made of cows-milk, or even of goats, may be substituted in its room, especially if the goats have been fed on fragrant herbs. In case the milk does not agree with the stomach, as frequently happens, it should be medicated in the following manner: take of red roses dried, of balauistines, pomegranate-rind, and cinnamon, each one dram; and boil them in a pint of cows-milk: when the decoction begins to boil, pour a little cold water into it, to make it subside. Repeat this process several times, and lastly strain off the liquor, sweeten it with sugar, and set it by for use. Others recommend equal quantities of milk and an infusion of male speedwell, fow-thistle, sage of Jerusalem, liverwort, colts-foot, ground-ivy, maiden-hair, flowers of St. John's wort, and roses, with a little sugar a few drops of oil of tartar per deliquium: this must be drank pretty warm, and continued for six weeks. But above all, fresh butter-milk is said to be the most efficacious specific.

Medicines that are gently corroborating are also useful: such are the solution of coral, or mother of pearl, in orange juice; cortex eleutherii, or peruvian bark, made

into an electuary with syrup of lemons. Heister affirms he has cured many of these fevers with the bark, in a few days. But above all things, riding daily must not be forgot, as being the best kind of exercise, and highly beneficial in these distempers.

Hectics attack children sometimes from voracity, and at others from refrigeration of the body; in which cases the use of the temperate baths of sweet water, continued for some time, is said to be of great service; and to remove the obstructions of the meseraic glands and vessels, the frequent but sparing use of the following saline aperient mixture will be necessary: take of salt of tartar, nitre, and arcanum duplicatum, each two drams; sal ammoniac, three drams: mix them all together, and let a little of the mixture be put into the child's drink, according to his age and strength.

HEDERA, IVY, in botany. See IVY.

HEDERA TERRESTRIS, GROUND-IVY, a genus of plants called by Linnæus glechoma. See the articles GLECHOMA and GROUND-IVY.

HEDGES, in agriculture, are either planted to make fences round inclosures, or to divide the several parts of a garden. When they are designed as outward fences, they are planted either with haw-thorn, crabs, or black-thorn; but those hedges which are planted in gardens, either to surround wilderness-quarters, or to screen the other parts of a garden from sight, are planted according to the fancy of the owner, some preferring ever-greens, in which case the holly is best; next the yew, then the laurel, laurustinus, phillyrea, &c. others prefer the beech, the hornbeam, and the elm. See the article GARDEN.

Before planting, it is proper to consider the nature of the land, and what sort of plants will thrive best in it; and also, what is the soil from whence the plants are to be taken. As for the size, the sets ought to be about the bigness of one's little finger, and cut within about four or five inches of the ground; they ought to be fresh taken up, straight, smooth, and well rooted. Those plants that are raised in the nursery, are to be preferred.

In planting outside hedges, the turf is to be laid with the grass-side downwards, on that side of the ditch the bank is designed to be made; and some of the best mould should be laid upon it to bed the quick, which is to be set upon it a foot asunder.

When

When the first row of quick is set, it must be covered with mould, and when the bank is a foot high, you may lay another row of sets against the spaces of the former, and cover them as you did the others: the bank is then to be topped with the bottom of the ditch, and a dry or dead-hedge laid, to shade and defend the under-plantation. Stakes should then be driven into the loose earth, so low as to reach the firm ground: these are to be placed at about two feet and a half distance, and in order to render the hedge yet stronger, you may edder it, that is, bind the top of the stakes with small long-poles, and when the eddering is finished, drive the stakes anew.

The quick must be kept constantly weeded, and secured from being cropped by cattle; and in February it will be proper to cut it within an inch of the ground, which will cause it strike root afresh, and help it much in the growth.

When an hedge is about eight or nine years growth, it will be proper to plash it; for the method of doing which, see the article PLASHING.

The crab is frequently planted for hedges; and if the plants are raised from the kernels of the small wild crabs, they are much to be preferred to those raised from the kernels of all sorts of apples without distinction; because the plants of the true small crab never shoot so strong as those of the apples, and may therefore be better kept within the proper compass of an hedge.

The black-thorn, or sloe, is frequently planted for hedges; and the best method of doing it, is to raise the plants from the stones of the fruit, which should be sown about the middle of January, if the weather will permit, in the place where the hedge is intended; but when they are kept long out of the ground, it will be proper to mix them with sand, and keep them in a cool place. The same fence will do for it when sown, as when it is planted.

The holly is sometimes planted for hedges; but where it is exposed, there will be great difficulty in preventing its being destroyed; otherwise, it is by far the most beautiful plant, and being an ever-green, will afford much better shelter for cattle in winter, than any other sort of hedge. The best method of raising these hedges, is to sow the stones in the place where the hedge is intended, and where this can be conveniently done,

the plants will make a much better progress than those that are transplanted; but these berries should be buried in the ground several months before they are sown. The way to do this, is to gather the berries about christmas, when they are usually ripe, and put them into large flower-pots, mixing some sand with them; then dig holes in the ground into which the pots must be sunk, covering them over with earth, about ten inches thick. In this place they must remain till the following October, when they should be taken up, and sown in the place where the hedge is intended to be made. The ground should be well trenched, and cleared from the roots of all bad weeds, bushes, trees, &c. Then two drills should be made, at about a foot-distance from each other, and about two inches deep, into which the seeds should be scattered pretty close, left some should fail. When the plants grow up, they must be carefully weeded; and if they are designed to be kept very neat, they should be cut twice a year, that is in May and in August; but if they are only designed for fences, they need only be sheered in July. The fences for these hedges while young, should admit as much free air as possible: the best sort are those made with posts and rails, or with ropes drawn through holes made in the posts; and if the ropes are painted over with a composition of melted pitch, brown spanish colour and oil, well mixed, they will last several years.

Hedges for ornament in gardens are sometimes planted with ever-greens, in which case the holly is preferable to any other. Next to this, most people prefer the yew; but the dead colour of its leaves renders those hedges less agreeable. The laurel is one of the most beautiful ever-greens, but the shoots are so luxuriant that it is difficult to keep it in any tolerable shape; and as the leaves are large, to prevent the disagreeable appearance given them by their being cut through with the sheers, it will be the best way to prune them with a knife, cutting the shoots just down to a leaf. The laurustinus is a very fine plant for this purpose; but the same objection may be made to this as to the laurel; this, therefore, ought only to be pruned with a knife in April, when the flowers are going off; but the new shoots of the same spring must by no means be shortened. The small-leaved and rough-leaved laurustinus are the best plants for  
this

this purpose. The true phillyrea is the next best plant for hedges, which may be led up to the height of ten or twelve feet, and if they are kept narrow at the top, that there may not be too much width for the (snow to lodge upon them, they will be close and thick, and make a fine appearance. The ilex or ever-green oak, is also planted for hedges, and is a fit plant for those designed to grow very tall. The deciduous plants usually planted to form hedges in gardens are, the hornbeam, which may be kept neat with less trouble than most other plants. The beech, which has the same good qualities as the hornbeam; but the gradual falling of its leaves in winter cause a continual litter. The small-leaved english elm is a proper tree for tall hedges, but these should not be planted closer than eight or ten feet. The lime-tree has also been recommended for the same purpose; but after they have stood some years they grow very thin at bottom, and their leaves frequently turn of a black disagreeable colour.

Many of the flowering shrubs have also been planted in hedges, such as roses, honeysuckles, sweet-briar, &c. but these are difficult to train; and if they are cut to bring them within compass, their flowers, which are their greatest beauty, will be entirely destroyed.

**HEDGE-HOG.** See *Hedge-HOG*.

**HEDGE-SPARROW**, the brown motacilla, white underneath, and with a grey spot behind the eyes. See *MOTACILLA*. This is of the bigness of the red-breast; the head is large and rounded; the eyes small, and their iris hazel; the beak is slender; the ears are large and patulous.

**HEDMORA**, a city of Sweden, in the province of Westmania, situated on the river Dalecarlia, fifty miles north-west of Upsal: east long.  $15^{\circ} 55'$ , and north lat.  $60^{\circ} 16'$ .

**HEDYOTIS**, in botany, a genus of the tetrandria-monogynia class of plants, the flower of which is monopetalous and infundibuliform; and its fruit is a bilocular capsule, containing a great number of seeds.

**HEDYSARUM**, the FRENCH HONEY-SUCKLE, in botany, a genus of the diadelphia-decandria class of plants, the corolla of which is papilionaceous and striated; the fruit of a bivalve articulated pod, each joint of which is roundish, compressed, and containing one kidney-shaped-seed.

This plant is deobstruent and vulnerary.

**HEEL**, in anatomy, the hind-part of the foot. See *FOOT* and *CALCANEUM*.

**HEEL of a horse**, the lower hinder part of the foot, comprehended between the quarters, and opposite to the toe.

The heel of a horse should be high and large, and one side of it should not rise higher than the other upon the pasteron. To recover the heels of a horse that is hoof-bound, you should take out his sole, and keep his heels very wide, by which they will be restored in a month.

**HEEL of a horseman.** This being the part that is armed by the spur, the word is used for the spur itself; as, this horse understands the heels well.

To ride a horse from one heel to another, is make him go sideways, sometimes to one heel, and sometimes to another.

**HEEL**, in the sea-language. If a ship leans on one side, whether she be a-ground or a-float, then it is said she heels a-starboard, or a-port; or that she heels offwards, or to the shore; that is, inclines more to one side than to another.

**HEEL of the mast**, that part of the foot of any mast, which is pared away slanting on the aftward side thereof, in order that it may be stayed aftward on. The heels of the top-masts are squares.

**HEELER**, or *Bloody HEEL-cock*, a fighting cock that strikes or wounds much with his spurs.

The masters know such a cock even while a chicken, by the striking of his two heels together in his going.

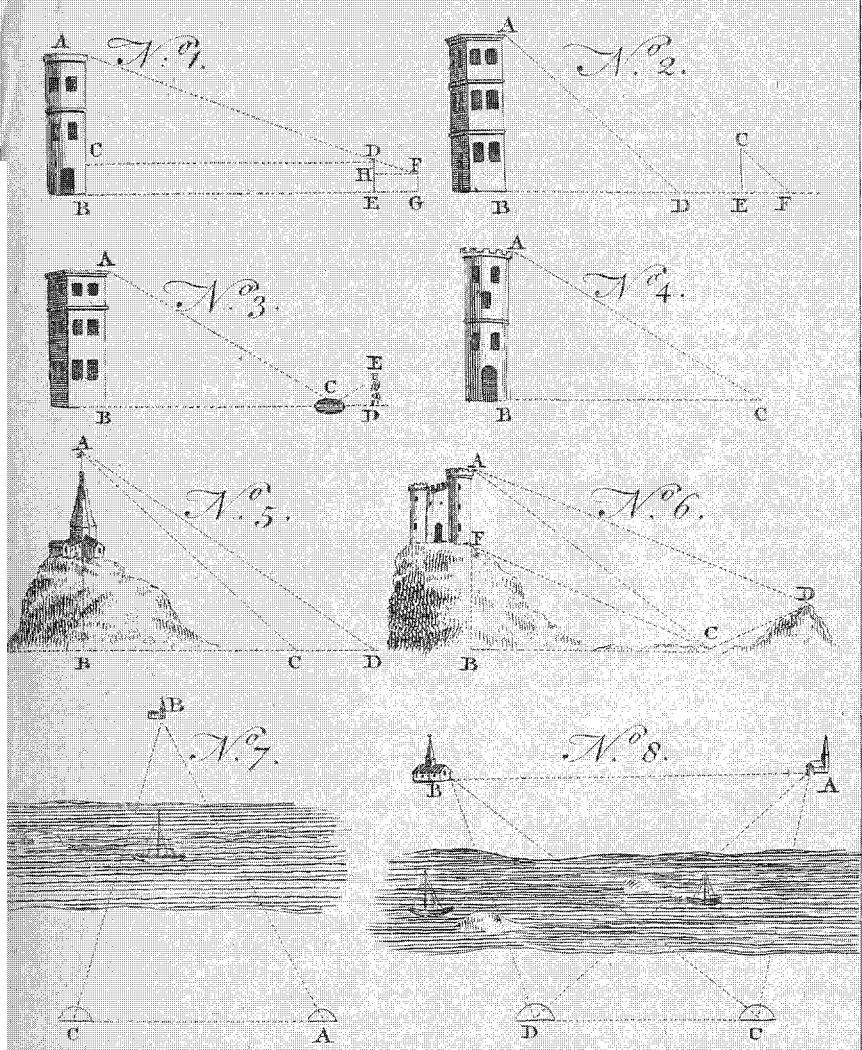
**HEGIRA**, in chronology, celebrated epocha among mahometans. See the article *EPOCHA*.

The event which gave rise to this epocha was the flight of Mahomet from Mecca, with his new proselytes, to avoid the persecution of the coraishites; who, being then most powerful in the city, could not bear that Mahomet should abolish idolatry, and establish his new religion. This flight happened in the fourteenth year after Mahomet had commenced prophet: he retired to Medina, which he made the place of his residence.

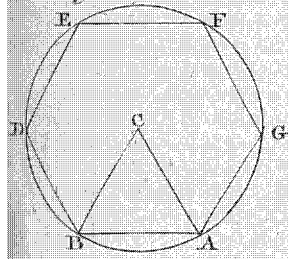
The mahometans have many fabulous traditions concerning this flight of their false prophet from Mecca to Medina: Having taken a resolution, say they, to leave the city, he went out one night, being the first of the moon, accompanied only by Abubeker, his father-in-law, and passed the night in a grotto, distant an hour's journey from Mecca. As soon



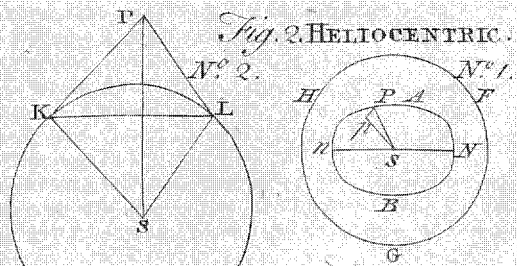
*Fig. 1. HEIGHTS & DISTANCES.*



*Fig. 3. HEXAGON.*



*Fig. 2. HELIOCENTRIC.*





as his retreat was known in the city, the coraischites, his declared enemies, went in pursuit of him, and arrived at the entrance of the grotto early the next morning: but that same night a large tree had grown up, at the mouth of the cave, in which the prophet was concealed; and what opening was left, was covered over with a spider's web; this being a plain indication, that nobody was in the cave, the coraischites went away, and Mahomet escaped the pursuit of his enemies.

HEIDELBURG, a city of Germany, in the circle of the lower Rhine, the capital of the palatinate, situated on the river Neckar: east long.  $8^{\circ} 40'$ , and north lat.  $49^{\circ} 20'$ .

HEIGHT, *altitudo*, in geometry, is a perpendicular let fall from the vertex, or top, of any right-lined figure, upon the base or side subtending it. It is likewise the perpendicular height of any object above the horizon; and is found several ways, by two staffs, a plain mirror, with the quadrant, theodolite, or some graduated instrument, &c.

The measuring of heights or distances is of two kinds: when the place or object is accessible, as when you can approach to its bottom; or inaccessible, when it cannot be approached.

Prob. I. To measure an accessible height AB, by means of two staffs. See plate CXXIX. fig. 1. n<sup>o</sup> 1.

Let there be placed perpendicularly in the ground, a longer staff DE, likewise a shorter one FG, so as the observator may see A, the top of the height to be measured, over the ends D, F, of the two staffs; let FH and DC, parallel to the horizon, meet DE and AB in H and C: then the triangles FHD, DCA, shall be equiangular; for the angles at C and H are right ones: likewise the angle A is equal to FDH; wherefore the remaining angles are also equal. Therefore as FH, the distance of the two staffs, is to HD, the excess of the longer staff above the shorter; so is DC, the distance of the longer staff from the tower, to CA, the excess of the height of the tower above the longer staff: and thence CA will be found by the rule of three. To which if the length DE be added, you will have the whole height of the tower BA.

Scholium. Another method may be occasionally contrived for measuring an accessible height, as by the given length of the shadow BD (*ibid.* n<sup>o</sup> 2.) I find out

the height AB: for let there be erected a staff CF, perpendicularly, producing the shadow EF: then it will be as EF, the shadow of the staff, is to EC, the staff itself; so is BD, the shadow of the tower, to BA, the height. Though the plane on which the shadow of the tower falls, be not parallel to the horizon, if the staff be erected in the same plane, the rule will be the same.

Prob. II. To measure an accessible height by means of a plain mirror.

Let AB (*ibid.* n<sup>o</sup> 3.) be the height to be measured; let the mirror be placed at C, in the horizontal plane BD, at a known distance BC: let the observer go back to D, till he see the image of the summit in the mirror, at a certain point of it, which he must diligently mark; and let DE be the height of the observer's eye. The triangles ABC and EDC, are equiangular; for the angles at D and B are right angles; and ACB, ECD, are equal, being the angles of incidence and reflection of the ray AC; wherefore the remaining angles at A and E, are also equal. Therefore it will be as CD is to DE; so is CB to BA.

Note 1. The observer will be more exact, if, at the point D, a staff be placed in the ground perpendicularly, over the top of which the observer may see a point of the glass exactly in a line betwixt him and the tower.

Note 2. In place of a mirror may be used the surface of water, which naturally becomes parallel to the horizon.

Prob. III. To measure an accessible height by the geometrical quadrant, theodolite, &c.

Let the angle C (*ibid.* n<sup>o</sup> 4.) be found. Then in the triangle ABC, right-angled at B (BC being supposed the horizontal distance of the observer from the tower) having the angle C, and the side BC, the required height will be found by the first case of plain trigonometry. Thus, suppose the angle C,  $37^{\circ} 24'$ , and the horizontal distance, BC 116, then the proportion will be as R: T. L C:: CB: BA, the height.

The tangent altitude $37^{\circ} 24'$	9.88341
Log. CB 116	2.06446
Added	11.94787
Radius	10.00000

Height of the object AB 88.69 1.94787

Supposing the observation made on the top of the tower, and the height of the tower to be known, to find the distance

of any object on the plane below; it is only the converse of the former case.

You may also, having the base and angles, easily find the hypotenuse  $AC$ , or how far it is from the top of the tower to the station, by the second case of right angled triangles: and it is useful in many cases. Prob. IV. To measure an inaccessible height by the geometrical quadrant, &c. at two stations.

Let the angle  $ACB$  be observed (*ibid.* n<sup>o</sup> 5.) then let the observer go from  $C$ , to the second station  $D$ , in the right line  $BCD$ ; and after measuring this distance  $CD$  take the angle  $ADC$  likewise with the quadrant. Then in the triangle  $ACD$ , which is formed by the two visual rays  $AD$ ,  $AC$ , and the distance of the two stations  $D$  and  $C$ , there is given the angle  $ADC$ , with the angle  $ACD$ , because the angle  $ACB$  was given before: therefore the remaining angle  $CAD$  is given likewise. But the distance of the stations  $C$  and  $D$  is also given; therefore by the second case of oblique-angled trigonometry, the side  $AC$  will be found. Wherefore in the right-angled triangle  $ABC$ , all the angles and hypotenuse  $AC$  are given; consequently by the third case of plain trigonometry, the height sought,  $AB$ , may be found; as also the distance of the station  $C$ , from  $AB$ , the perpendicular within the hill or inaccessible height.

Example. Suppose the angle at  $C$ ,  $43^{\circ} 30'$ , and the angle at  $D$   $32^{\circ} 12'$ , and the distance  $CD$ , betwixt the two stations,  $112$  feet; then the angle  $DAC$  will be  $11^{\circ} 18'$ , and the angle  $CAB$   $46^{\circ} 30'$ . Hence for  $CA$ , the proportion will be as  $S. \angle DAC : DC :: S. \angle D : CA$ .

The log.  $DC$   $112$  — 2.04922  
Sine  $\angle D$   $32^{\circ} 12'$  — 9.72663

Added 11.77585

$S. \angle DAC$   $11^{\circ} 18'$  — 9.29214

$CA = 304.6$  — 2.48371

Then for  $AB$ , the height of the object, it will be as  $R : S. \angle ACB :: CA : AB$ .

As radius — 10.00000

is to the sine of  $43^{\circ} 30'$  — 9.83781

so is  $CA$   $304.6$  — 2.48371

to  $AB$   $209.7$  — 2.32152

Lastly, for  $CB$ , the distance of the object from the nearest station, it will be as  $R : S. \angle CAB :: CA : CB$ .

As radius — 10.00000

is to the sine of  $CAB$   $46^{\circ} 30'$  9.86056

so is  $CA$   $304.6$  — 2.48371

to  $BC$   $221$  — 2.34427

If the height of the tower is wanted, the angle  $BCF$  (*ibid.* n<sup>o</sup> 6.) may be found with the quadrant, which being taken from the angle  $ACB$  already known, the angle  $ACF$  will remain; but the angle  $FAC$  was known before; therefore the remaining angle  $AFC$  will be known. But the side  $AC$  was supposed found by the last problem; therefore in the triangle  $AFC$ , all the angles, and one of the sides  $AC$  being known  $AF$  the height of the tower above the hill may be found by trigonometry.

Prob. V. To measure the distance of two places  $A$  and  $B$ , of which one,  $A$ , is accessible, by the theodolite, &c. *ibid.* n<sup>o</sup> 7.

Let there be erected at two points,  $A$  and  $C$  (sufficiently distant) visible signs; then let the two angles  $BAC$ ,  $BCA$ , be taken by the theodolite. Let the distance of the stations  $A$  and  $C$  be measured with a chain. Then the third angle being known, and the side  $AC$ ; therefore, by the second case of oblique trigonometry, the distance required  $AB$ , will be found.

Prob. VI. To measure, by the theodolite, &c. the distance of two places, neither of which is accessible. *ibid.* n<sup>o</sup> 8.

Let two stations  $C$  and  $D$  be chosen, from each of which the places may be seen whose distance is sought: let the angles  $ACD$ ,  $BCD$ , and likewise the angles  $BDC$ ,  $BDA$ ,  $CDA$ , be measured by the theodolite, &c. the distance of the stations  $C$  and  $D$  be measured by a chain, or, if necessary, by the last problem. Now in the triangle  $ACD$ , there are given two angles  $ACD$  and  $ADC$ ; therefore the third  $CAD$  is likewise given: moreover the side  $CD$  is given; therefore by the second case of oblique trigonometry, the side  $AD$  will be found. After the same manner, in the triangle  $BCD$ , from all the angles, and one side  $CD$  given, the side  $BD$  is found. Wherefore in the triangle  $ADB$ , from the given sides  $DA$  and  $DB$ , and the angle  $ADB$  contained by them, the side  $AB$  (the distance sought) is found to be the fourth case of oblique angled trigonometry. Note, That it is not necessary that the points  $A$ ,  $B$ ,  $C$ , and  $D$  be in one plane, and that any triangle is in one plane.

HEILA, a port-town of regal Prussia, in the kingdom of Poland, situated on the point of the peninsula in the Baltic-sea, twelve miles north of Dantzick: east long.  $19^{\circ}$ , north lat.  $54^{\circ} 30'$ .

**HEINUSE**, among hunters, a roe-buck of the fourth year.

**HEIR**, *heres*, in law, signifies the person who succeeds another by descent to lands, tenements, and hereditaments, being an estate of inheritance, or an estate in fee; because nothing passes by right of inheritance but in fee.

Where there is a grandfather, father and son, if the father die before the grandfather, who afterwards dies seised in fee, the land, in that case, shall go to the eldest grandson, and not to any other children of the grandfather. On the father's dying without issue, &c. the next eldest brother shall have the lands, &c. as heir; and for want of a brother, they descend to the father's sisters. A man has issue only a daughter, and dies leaving his wife with child of a son, who is afterwards born; here the son, after his birth, is heir; however, in the mean time, the daughter is to have the land. Yet there are some persons disqualified from being heirs, as a bastard, an alien, one attainted of treason or felony, &c. but idiots and lunatics, persons excommunicated, or that are attainted in a premonition, and out-laws in debt, &c. are capable of being heirs.

The word heir is a collective term, and extend to all heirs, under which the heirs of heirs are comprehended; as where lands are given to a person and his heirs, all his heirs are thereby totally in him. The heir is favoured by common law: for not only land, but rent not due and in arrear at the death of the ancestor, shall go to the heir; so corn sown by a tenant for years, where his term expires before his corn is ripe, and every thing fastened to the freehold, timber-trees, deeds belonging to the inheritance, deer, conies, pigeons, fish, &c. go to the heir.

Where an ancestor has bound himself and his heirs for the payment of money, or performance of some other act, the heir, tho' never so much land comes to him from such ancestor by gift in tail, or other such conveyance of the father, and not by descent, is no way chargeable; and it is likewise so in all other estates, except fee simple. If land be granted to a person and his heirs during the life of another, &c. the heir shall not be charged for this, no more than for lands entailed. The heir's body ought not to be taken in execution for the debt of his ancestor, nor any other lands but those

he received in the case of descent: and whether an heir has land by descent or not, he is triable by a jury, who are to ascertain the value of the lands descended, in order to make the heir answerable. A creditor may sue either the heir, executor, or administrator, each of whom are chargeable; as is also a collateral heir, but in that case he must be specially charged as such: but where an heir, on being sued, pays his ancestor's debts, he shall be reimbursed by the executor of such ancestor, if he has assets in his hands. The heir has this advantage, that he can force the administrator to pay debts out of the personal estate of the intestate, in order to preserve the inheritance free; and where an executor has assets, the heir may in equity compel him to redeem a mortgage.

**HEIR-APPARENT**, is a person so called in the lifetime of his ancestor, at whose death he is heir at law.

**HEIRESS**, a female heir to one who has an estate in lands, &c. Stealing an heiress, and marrying her against her will, was declared felony by 3 Hen. VII.

**HEIR-LOOME**, is a word that comprehends in it divers pieces of furniture; as the first bed, and other things, which by the custom of some places have belonged to a house for several descents. These are never inventoried after the death of the owner as chattles, and therefore do not go to the executor or administrator, but to the heir along with the house, by custom, and not by common law.

Heir-loomes are not devisable by will, for custom vests them in the heir before a devise: yet a sale thereof in the person's lifetime might make it otherwise.

**HELEGUG**, in ornithology, a name given to the arctic duck of Clavius.

**HELENA**, or *St. HELENA*, an island in the Atlantic ocean, situated 1200 miles west of the coast of Africa, and 1800 east of the coast of South America: west long. 6° 13', south lat. 16°.

It is about twenty-one miles round, and consists of one steep rock, which looks like a castle in the middle of the sea, and which is covered with about a foot of vegetable earth, that produces corn, grapes, and almost all manner of fruits and vegetables: but the corn is generally eaten up by the rats, and the country is too hot to make wine. It has but one landing place, which is defended by a platform, and a fort in which the govern-

nor resides. It is subject to the english East-India company, by whose assistance it was planted, after it was taken from the Dutch in the reign of king Charles II. **St. HELENA'S DAY**, a festival in the romish church on the 18th of August. This saint was the empress Helena, daughter of the emperor Constantine, who, it is said, discovered the cross of Christ after it had been long buried in the ground.

**HELENA**, in astronomy. See the article **CASTOR**.

**HELENIA**, or **HELENIASTRUM**, **BASTARD-ELECAMPANE**, in botany, a genus of the syngenesia-polygamia-superflua class of plants, the compound flower of which is radiated, and consists of a multitude of hermaphrodite and female ones, the former on the disk, and the latter on the verge. The hermaphrodite flowers are tubular, and quinque-dentate at the limb; whereas the female ones are linear, ligulated, and trifid at the point. The stamina are five slender and very short filaments; and the seed which is single, is contained in the cup.

**HELENUM**, **ELECAMPANE**, in botany, &c. is ranked by Linnaeus among the star-worts. See the articles **ASTER** and **ELECAMPANE**.

**HELEPOLIS**, in the antient art of war, a machine for battering down the walls of a place besieged, the invention of which is ascribed to Demetrius, the Poliorcete.

Diodorus Siculus says, that each side of the helepolis was 405 cubits broad, and 90 in height; that it had nine stages, and was carried on four strong solid wheels eight cubits in diameter; that it was armed with large battering rams, and had two roofs capable of supporting them; that in the lower stages there were different sorts of engines for casting stones; and in the middle they had large catapultas for lancing arrows, and smaller in those above, with a number of expert men for working all these machines.

**HELIACAL**, in astronomy, a term applied to the rising or setting of the stars, or, more strictly speaking, to their emergence out of and immersion into the rays and superior splendor of the sun.

A star is said to rise heliacally, when after having been in conjunction with the sun, and on that account invisible, it comes to be at such a distance from him, as to be seen in the morning before sun-rising; the sun, by his apparent motion, receding from the star towards the east;

on the contrary, the heliacal setting is when the sun approaches so near a star, as to hide it with his beams, which prevent the fainter light of the star from being perceived, so that the terms apparition and occultation would be more proper than rising and setting.

All the fixed stars in the zodiac, as also the superior planets, mars, jupiter, and saturn, rise heliacally in the morning, a little before sun-rising, and a few days after they have set cosmically. Again, they set heliacally in the evening, a little before their achronycal setting. But the moon, whose motion eastward is always quicker than the apparent motion of the sun, rises heliacally in the evening, after the new moon; and sets heliacally in the morning, when old and approaching to a conjunction with the sun.

The inferior planets, venus and mercury, which sometimes seem to go westward from the sun, and sometimes again have a quicker motion eastward, rise heliacally in the morning, when they are retrograde; but when direct in their motions, they rise heliacally in the evening. The heliacal rising or setting of the moon, happens when she is  $17^{\circ}$  distant from the sun; but for the other planets,  $20^{\circ}$  are required; and for the fixed stars, more or less according to their magnitude.

**HELIAEA**,  $\epsilon\lambda\iota\alpha\iota\alpha$ , in grecian antiquity, was the greatest and most frequented court in Athens for the trial of civil affairs. The judges who sat in it, were at least fifty, but the more usual number was either two or five hundred. When causes of great moment were to be tried, it was customary to call in the judges of the other courts: sometimes a thousand were called in, and then two courts are said to have been joined: sometimes fifteen hundred or two thousand were called in, and then three or four courts met together.

They had cognizance of civil affairs of the greatest weight and importance, and were not permitted to give judgment till they had taken a solemn oath to do it with impartiality, and to give sentence according to the laws, &c.

**HELIANTHUS**, the **GREAT SUN-FLOWER**, in botany, a genus of the syngenesia-polygamia-frustranea class of plants, the compound flower of which is radiated, with a multitude of cylindraceous hermaphrodite flowers on the disk, and a few very long ligulated female ones: the stamina are five filaments; and the seeds

are single, and contained in the cup. The flowers are yellow, and often more than a foot in diameter.

**HELIASTES**, in antiquity, one of the judges of the court of helixæ. See the article **HELIÆA**.

**HELICTERES**, the **SCREW-TREE**, in botany, a genus of the gynandria-decandria class of plants, the flower of which consists of five oblong petals, equal in breadth; and the fruit is composed of five unilocular capsules, containing a great many kidney-shaped seeds, and twisted spirally about one another.

**HELIOCARPOS**, in botany, a genus of the polyandria-digynia class of plants, the flower of which consists of four linear petals, considerably shorter and narrower than those of the cup: the fruit is a pedunculated, bilocular capsule, of a turbinated oval figure, containing single seeds of an oval shape.

**HELIOCENTRIC latitude of a planet**, the inclination of a line drawn between the center of the sun and the center of a planet, to the plane of the ecliptic, which may be thus determined.

If the circle *FGH* (plate *CXXIX*. fig. 2. n° 1.) represent the orbit of the earth round the sun, and the inner one, *ANBz*, be so placed as to incline to the plane of the other; (on which account it appears in the form of an ellipsis) then when the planet is in the node *z*, it will appear in the ecliptic, and so have no latitude. But if it move to *P*, then, being seen from the sun, it will appear to decline from the ecliptic, or to have latitude; and the inclination of the line *SP* to the plane of the ecliptic, is called the planet's heliocentric latitude; the measure of which is the angle *PSp*, supposing the line *Pp* to be perpendicular to the plane of the ecliptic.

This heliocentric latitude will be continually increasing till the planet come to the point *A*, which they call the limit, or utmost extent of it; and then it will decrease again, till it reach the other node *N*, when it will have no latitude; after which it will increase again, till it come to *B*, or its utmost latitude; and, lastly, decrease again, till the planet come to be in *z*, whence it set out.

**HELIOCENTRIC place of a planet**, in astronomy, the place of the ecliptic wherein the planet would appear to a spectator placed at the center of the sun.

The ingenious *Dr. Halley* gives the fol-

lowing method to find the heliocentric places of a planet, and its distances from the sun, which supposes only that the periodical time of the planet is known. Let *KLB* (*ibid*. n° 2.) be the orbit of the earth, *S* the sun, *P* the planet, or rather the point in the plane of the ecliptic, in which the perpendicular let fall from the planet meets that plane. And first when the earth is in *K*, observe the geocentric longitude of the planet, and having the theory of the earth, we have the apparent longitude of the sun, and consequently, the angle *PKS*. The planet, after it has completed an entire revolution, returns again to the point *P*, at which time suppose the earth in *L*; and there again, let the planet be observed, and find the angle *PLS*, the planet's elongation from the sun. Having the times of observations, we have the places of the earth in the ecliptic, or the points *K* and *L*; and, consequently, the angle *LSK*, and the sides *LS* and *SK*: wherefore we shall have the angles *SKL* and *SLK*, and the side *LK*. From the known angles *SKP* and *SLP*, take away the known angles *SKL* and *SLK*, and we shall have the angles *PKL* and *PLK* known; therefore in the triangle *PLK*, having all the three angles, and the side *LK*, we shall find the side *PL*; and in the triangle *PLS*, having the sides *PL* and *LS*, and the intercepted angle *PLS*, we shall have the angle *LSP*, which determines the heliocentric place, and its distance from the node according to the ecliptic, as also the side *SP*. But as the tangent of the geocentric latitude is to the tangent of the heliocentric, so is the curtate distance of the planet from the sun, to its curtate distance from the earth. But as the geocentric latitude may be found by observation, the heliocentric latitude will also be found; by which, and the curtate distance of the planet from the sun, we can find the true distance.

**HELIOCOMETES**, a phenomenon sometimes observed about sun-setting; being a large luminous tail, or column of light, proceeding from the body of the sun, and dragging after it, not unlike the tail of a comet; whence the name.

**HELIOSCOPE**, in optics, a sort of telescope, peculiarly fitted for viewing the sun, without hurting the eyes. See the article **TELESCOPE**.

As the sun may be viewed through coloured glasses, without hurt to the eyes.

if the object and eye-glasses of a telescope be made of coloured glass, as red or green, such a telescope will become an helioscope.

But Mr. Huygens only used a plain glass, blacked at the flame of a candle on one side, and placed between the eye-glass and the eye; which answers the design of an helioscope very well.

**HELIOSTATA**, in optics, an instrument invented by the late learned Dr. S Gravesande; who gave it this name, from its fixing, as it were, the rays of the sun in an horizontal direction across the dark chamber, all the while it is in use.

This instrument is an automaton, or piece of clock-work, whose parts are as follows. A A (plate CXXX.) is a frame in which a metalline speculum S is suspended, moveable about its axis by means of two small screws *a, a*. This frame is fixed to the piece C, which being hollow, is moveable upon the cylindric shaft P. This pillar is fixed on a triangular base or foot set perpendicular, by the three screws B, B, B.

On the back part of the speculum is fixed a long cylindric wire, or tail D, in a perpendicular position. By this it is connected to the second part of the heliostata, which is a common thirty-four hour clock, represented at H, the plane of which clock is set parallel to that of the equator in any given place. The clock is sustained on the column F G, in which it is moveable up and down by a thin lamina or plate that enters it as a case, and fixed by a proper height by two screws *d, d*, at the side. The whole is truly adjusted to a perpendicular situation by means of the three screws I, I, I, in the tripod L, L, M, and the plummet Q, whose capsis must answer to the point *o* beneath.

The axis of the wheel which moves the index N O, over the hour circle, is somewhat large, and perforated with a cylindric cavity approaching a little to a conical figure; and receives the shank of the said index N O very close and tight, that by its motion the index may be carried round. In the extremity, O, of the index is a small cylindric piece, with a cylindric perforation to receive the tail *t* of the fork T, yet so as to admit a free motion therein. In each side of the fork are several holes exactly opposite to each other, in which go the screws *r, r*, upon whose smooth cylindric ends moves the tubular piece R.

When the machine is to be fixed for use, another part is made use of to adjust it; which is called the positor, and is denoted by the letters V X Y Z.

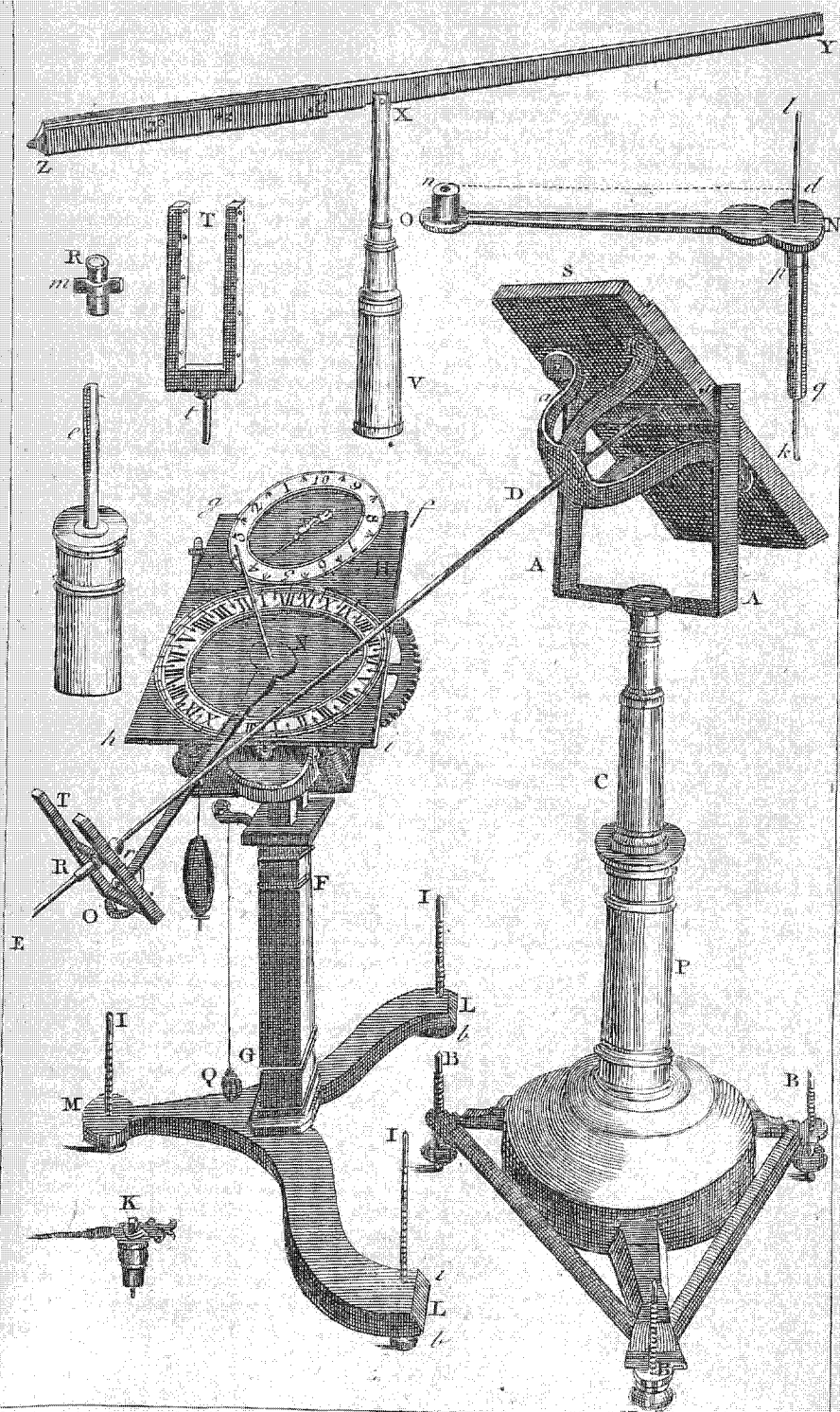
The cylinder C is removed with a speculum from the foot P, and the brass column V X put on in its stead, and adheres more strictly to the pin *e*, that it may keep its position while the machine is constituted.

On the top of the column, about X as a center, moves the lever Y Z, so that it may be any how inclined to the horizon, and keep its position. The arm Y X may be of any length at pleasure; but the arm X Z is of a peculiar construction, and of a determinate length. To this arm, which extends no farther than *y*, is a sliding-piece Z *x*, sharp pointed at Z. By this the arm X Z is determined to a given length, the piece Z *x* being fixed by the screws *z z*. Upon this arm is drawn the short line *o x*, by which it may be lengthened in the whole, and is  $\frac{9}{10}$  of the whole length X Z, when shortest. The reason is, this arm is always to increase and decrease in proportion to the secant of the sun's declination to the radius X Z, when shortest; but the radius is to the secant of  $23^{\circ} 30'$  (the sun's greatest declination) as 10000000 to 10904411, or as 100 to 109. Now the reason of this construction of the arm X Z, is to find for any given day the distance of the center of the speculum S from the top *l* of the style *l N*, which must ever be equal to the secant of the sun's declination; for it must always be equal to the distance of the top of the said style, *l*, from the center of the cylinder R in the fork T, and that is always equal to the said secant of declination.

For since the style *l N* and the fork T are in a position parallel to each other, therefore the middle hole in the sides of the fork being (as they must be) of the same height above the end of the index O, as is the height of the style *l N*, it is evident that on an equinoctial day the sun's rays will pass directly through the perforation of the piece R, if it be put in a position parallel to the plane of the ecliptic, or that of the clock; and also that the top of the shadow of the said style will fall exactly on the said hole. In this case the top of the style is at the least distance from the central point of R, and therefore may be represented by radius; while in any other position above or below, the distance will increase in propor-



HELIOSTATA.





tion to the secant of the angle which the rays make with this first or middle ray, that pass by the top of the style, and through the hole R.

Now it may be demonstrated, that on any day of the year, if the clock and its pedestal be so fixed that the line of XII be exactly in the meridian, and that the position of R in the fork be such that the sun's rays go directly through it, and the shadow of the style's top fall just upon the hole; moreover, if the distance of the center of the speculum S from the top of the style I be made equal (by the positor) to the distance of the central point of R therefrom; and, lastly, the nail of the speculum DE passing through R; then if the clock be put into motion, the index N O shall carry about the tail of the speculum in such a manner, that at all times of that day, when the sun can come upon the speculum, it will reflect the rays constantly in one and the same position and direction all the time without variation.

The machine thus constituted, is placed in a box or case, and set in a window with one side open, exposed to the sun, and all the other parts close; so that when the room is made dark, and the solar microscope fixed to the fore-part of the box in which the heliostat is placed, just against the center of the speculum to receive the reflected horizontal beam, all the experiments of the darkened room are then performed as usual.

This is a very ingenious construction of a solar microscope-apparatus, but, we fear, too expensive and troublesome for common use. However, it is easy to see that this machine is capable of being greatly reduced; since it may be made to answer the end very well without a clock and the speculum may be glass instead of metal, and all fixed in one pedestal. See the article MICROSCOPE.

**HELIOTROPE**, *heliotropium*, in botany, a genus of the pentandria-monogynia class of plants, the corolla of which consists of a single petal; the tube is of the length of the cup; the limb is plane, divided lightly into five segments, and obtuse; the smaller segments stand alternate, and are acute; the large are placed between; the mouth is closed by five prominent squamulæ, which bending toward one another, form a little star: there is no pericarpium; the calyx remains unaltered, and contains four oval acuminate seeds.

A decoction of this plant purges phlegm and bile. It is good against the sting of serpents: it consumes warts, and provokes the menses, and the expulsion of the fœtus.

**HELIOTROPE**, in fossil history, a hard bluish-green jasper, with red variegations. See the article JASPER.

**HELIX**, in geometry, the same with spiral. See the article SPIRAL.

In architecture some authors make a difference between the helix and the spiral. A stair case according to Daviler, is an helix, or is helical, when the stairs or steps wind round a cylindrical newel; whereas the spiral winds round a cone, and is continually approaching nearer and nearer its axis.

**HELIX** also signifies the caulicoles, or little volutes, under the flower of the corinthian capital, called also urillæ.

**HELIX**, in anatomy, is the whole circuit or extent of the auricle outwards, in opposition to which the inner protuberance answering thereto, is called anthelix. See the article EAR.

**HELL**, *gehenna*, *tartara*, *hades*, *infernus*, &c. the place of divine punishment after death, in contradiction to heaven. See the article HEAVEN.

As all religions have supposed a future state of existence after this life, so all have their hell or place of torment, in which the wicked are supposed to be punished. The hell of the ancient heathens was divided into two mansions, the one called elysium, on the right hand, pleasant and delightful, appointed for the souls of good men; the other called tartara, on the left, a region of misery and torment, appointed for the wicked. The latter was only hell in the present restrained sense of the word. See the article ELYSIUM.

Of all the poets of antiquity, Virgil is the most particular in his description of hell; having carried his hero thither, and given him a full view of these infernal regions: for an account of which we must refer the reader to the sixth Æneid of that poet, where the many dreadful apparitions, as gorgons, harpies, chimæras, and the like, are strongly painted, and a description of Charon, the old ferryman of hell, his business, together with the officer of Minos and Radamanthus, two of the judges of hell, are very lively represented. The opening of the adamantine gate, discovers to Æneas the almost recesses of tartara, or hell, which according

according to the poet is twice as deep as the earth is distant from the skies. Here Æneas sees various persons condemned to punishment, as also the different kinds and forms of torture which are so numerous, that the poet concludes, *non mihi si linguæ centum, &c.*

" Had I an hundred mouths, an hundred tongues,

" And throats of brass inspired with iron lungs,

" I could not half these horrid crimes repeat,

" Nor half the punishments these crimes have met."

*Dryden.*

The antient philosophers were of opinion, that the infernal regions were at an equal distance from all the parts of the earth; nevertheless it was the opinion of some, that there were certain passages which led thither, as the river Lethe, near the Syrtes, and the æcherusian cave in Epirus. At Hermione it was thought, that there was a very short way to hell; for which reason, the people of that country never put the fare into the mouths of the dead to pay their passage. Ulysses, according to Homer, went by sea to the country of the Cimmerians, in order to go thither; and Æneas went by the lake of the cave of Avernus.

The Jews placed hell in the center of the earth, and believed it to be situated under waters and mountains. According to them there are three passages leading to it: the first is in the wilderness, and by that Korah, Dathan and Abiram descended into hell; the second is in the sea, because Jonah, who was thrown into the sea, cried to God out of the belly of hell; the third is in Jerusalem, because it is said the fire of the Lord is in Zion, and his furnace is in Jerusalem. They likewise acknowledged seven degrees of pain in hell, because they find this place called by seven different names in scripture. Though they believed that infidels, and persons eminently wicked, will continue for ever in hell; yet they maintained, that no Jew, who is not infected with some heresy, and has not acted contrary to the points mentioned by the Rabbins, will be punished therein for any other crime above a year at most.

The mahometans believe the eternity of rewards and punishments in another life. In the Koran it is said, that hell has seven gates, the first for the Mussulmans, the second for the Christians, the third for the Jews, the fourth for the Sabians, the

fifth for the Magians, the sixth for the Pagans, and the seventh for the hypocrites of all religions.

Among Christians, there are two controverted questions in regard to hell, the one concerns locality, the other the duration of its torments. The locality of hell, and the reality of its fire, began first to be controverted by Origen. That father interpreting the scripture account metaphorically, makes hell to consist not in external punishments, but in a consciousness or sense of guilt, and a remembrance of past pleasures. Among the moderns, Mr. Whiston advanced a new hypothesis. According to him the comets are so many hells appointed in their orbits alternately to carry the damned into the confines of the sun, there to be scorched by its violent heat, and then to return with them beyond the orbit of saturn, there to starve in these cold and dismal regions. Another modern author not satisfied with any hypothesis hitherto advanced, assigns the sun to be the local hell. As to the second question, *viz.* the duration of hell torments, we have Origen again at the head of those who deny that they are eternal; it being that father's opinion, that not only men, but devils, after a due course of punishment suitable to their respective crimes, shall be pardoned and restored to heaven. The chief principle upon which Origen built his opinion, was the nature of punishment, which he took to be emendatory, applied only as physic for the recovery of the patient's health. The chief objection to the eternity of hell torments among modern writers, is the disproportion between temporary crimes and eternal punishments. Those who maintain the affirmative, ground their opinions on the scripture accounts, which represent the pains of hell under the figure of a worm which never dies, and a fire which is not quenched; as also upon the words, " These shall go away into everlasting punishment, but the righteous into life eternal."

**HELLEBORE**, *helleborus*, in botany, a genus of the polyandria polygynia class of plants, with a rosaceous flower, composed of five or more roundish and large petals: the fruit is composed of several bicarinated capsules, containing a great number of roundish seeds. See plate CXXXI. fig. 1.

The root of this plant is the true black hellebore of the shops, which is a purge,

purge; but not a very safe one; being sometimes given in substance from ten grains to twenty. In tincture, it is principally used as an alterative, for attenuating the humours. It has been always famous in maniac cases, and is still given in them, tho' rather as an alternative than a purge: for at present, the use of black hellebore as a purge is out of doors; the chemical preparations of antimony and mercury having been found much more certain, and to answer as well all its purposes. The dose of the tincture is from 15 to 50 drops, which is given in hysseric cases, and obstructions of the viscera.

*White HELLEBORE*, in pharmacy, the root of the broad leaved veratrum. See the article VERATRUM.

White hellebore, given in powder or in infusion, is a very rough vomit; and, at present, is never used but when very desperate diseases call for such a remedy. It is a powerful sternutatory, and is sometimes used as such in soporose diseases; but the principal use made of it at present is externally, in unguents for the itch, among the common people.

*HELLENISM*, in matters of language, a phrase in the idiom, genius, or construction of the greek tongue.

This word is only used when speaking of the authors who writing in a different language, express themselves in a phraseology peculiar to the greek.

*HELLENISTIC*, or *HELENISTIC LANGUAGE*, that used by the grecian Jews who lived in Egypt and other parts where the greek tongue prevailed. In this language it is said the Septuagint was written, and also the books of the New Testament; and that it was thus denominated to shew that it was greek filled with hebraisms and syriacisms.

*HELLENODICÆ*, in grecian antiquity, the directors of the olympic games. See the article OLYMPIC.

*HELLESPONT* the entrance of the streights which divide Asia from Europe, and pass from the Archipelago to Constantinople. It is now called the Dardanelis, and is about two miles wide.

*HELM of a ship*, is a piece of timber fastened into the rudder, which comes forward into the steerage, or place where the person at the helm steers the ship, by holding the whipstaff in his hand, which is joined to the helm. They begin however to be left off, steering-wheels being used in their room.

There are several terms in the sea-lan-

guage relating to the helm; as, *bear up the helm*; that is, let the ship go more large before the wind. *Helm a mid-ship*, or *right the helm*; that is, keep it even with the middle of the ship. *Port the helm*, put it over the left side of the ship. *Starboard the helm*, put it on the right side of the ship.

*HELMET*, an antient defensive armour worn by horsemen both in war and in tournaments. It covered both the head and face, only leaving an aperture in the front secured by bars, which was called the visor.

It is still used in heraldry by way of crest over the shield or coat of arms, in order to express the different degrees of nobility, by the different manner in which it is borne. Thus a helmet in profile, is given to gentlemen and esquires: to a knight, the helmet standing forward and the beaver a little open: the helmet in profile and open, with bars, belongs to all noblemen under the degree of a duke: and the helmet forward and open, with many bars, is assigned to kings, princes, and dukes.

There is generally but one helmet upon a shield; but sometimes there are two, and even three: if there be two, they ought to face each other; and if three, the middlemost should stand directly forward, and the other two on the sides facing towards it.

*HELMINTHOLITHUS*, in natural history, a name given by Linnæus to petrified bodies resembling worms.

Of these he reckons four genera. 1. Petrified lithophyta, found in the mountains of Sweden. 2. Petrified shells. 3. Petrified zoophytes. 4. Petrified reptiles. See LITHOPHYTA, SHELL, &c.

*HELMONT*, a town of the Netherlands, in the province of dutch Brabant, situated on the river Aa: east longitude 5° 40', north latitude 51° 30'.

*HELMSTAT*, a town of Germany, in the circle of Lower Saxony, and dukedom of Brunwic: east long. 11° 15', north lat. 52° 20'.

*HELONIAS*, in botany, a genus of the hexandria-trigynia class of plants, without any flower petals; the fruit is an oval berry, containing only one cell, in which is a single oval seed.

*HELOTS*, in grecian antiquity, the inhabitants of Helos, a town of Laconia, conquered by the Spartans; who made them all prisoners of war, and reduced them into the condition of slaves.

The freemen of Sparta were forbidden the exercise of any mean or mechanical employment, and therefore the whole care of supplying the city with necessaries, devolved upon the Helots: the ground was tilled, and all sorts of trade managed by them, whilst their masters, gentlemen like, spent their time in all sorts of manly exercises. Notwithstanding the great usefulness of the Helots, they were treated in the most barbarous manner, and often murdered without any shew of justice. It was a thing common with the Spartans to force them to drink to excess, and then lead them in that condition into their public halls, that their children might see what a contemptible and beastly sight a drunken man is. They made them dance uncomely dances, and sing ridiculous songs; forbidding them expressly to use any that was serious and manly.

**HELPS**, in the manege. To teach a horse his lesson, there are seven helps or aids to be known: these are the voice, rod, bit or snaffle, the calves of the legs, the stirrups, the spur, and the ground.

The helps are occasionally turned into corrections.

**HELSINGFORD**, a port-town of Sweden, situated on the gulph of Finland, in  $24^{\circ} 6'$  east long. and  $60^{\circ} 8'$  north lat.

**HELSINGIA**, a province of Sweden, bounded by the Bothnic gulph on the east, and by Delecarlia on the west.

**HELSINGIC CHARACTER**, a peculiar kind of character, found inscribed on stones in the province of Helsingia: the runic and helsingic characters may be easily transformed into each other.

**HELSTON**, a borough of Cornwall, nine miles south-west of Falmouth: it sends two members to parliament.

**HELVE**, a term used among country people for the handle of a hatchet, pick-ax, mattock, or the like.

**HELVETIC**, something belonging to Helvetia, or Switzerland. See the article SWITZERLAND.

**HELVOETSLUYS**, a port-town of the United Netherlands, situated in the island of Voorn, in the province of Holland, five miles south of the Briel: it is one of the best harbours in Holland, and that to which the english packet always goes.

**HELXINE**, BUCK-WHEAT, in botany, a genus of the octandria-trigynia class of plants, the corolla of which is permanent, and consists of a single petal, divided into five obtuse, erecto-patent seg-

ments: there is no pericarpium, the corolla performs the office of it, and surrounds the seed, which is single, triquetrous, and acute.

**HEM**, in the ovens for baking calamine, a partition which separates the hearth from the oven itself: it is open at top, to let the flame pass over to bake the calamine.

**HEMERO-BAPTISTS**, a sect among the Jews, so called because they washed themselves every day, making holiness to consist in these daily ablutions.

They were pharisees in every thing, except that with the sadducees, they denied a resurrection. Probably these were the sect who found fault with our Saviour's disciples for eating with unwashed hands, D'Herbelot tells us, that the disciples of St. John Baptist, who, in the first ages of the church, were called hemero-baptists, and the number of whom is considerable among the Jews, have since that time formed a sect, or rather religion apart, under the name of mendai jahia.

**HEMEROBIUS**, in zoology, a genus of insects of the neureptera order, the characters of which are these: the palate is prominent, and has on each side two tentacula: the wings, being four in number, are deflex and tumid.

To this genus belong the golden-eye, a large beautiful fly, so called from the colour of its eyes; the formica-leo, and several other species.

**HEMEROCALLIS**, DAY-LILLY, in botany, a genus of the hexandria monogynia class of plants, the corolla of which is of an infundibuliform figure; the tube is short; the limb is patent, and divided into six somewhat reflex segments: the fruit is an ovato-trilobous, trigonal capsule, formed of three valves, and containing three cells: the seeds are numerous and roundish.

**HEMERODROMI**, in grecian antiquity, centinels and guards appointed for the security and preservation of cities, and other places.

They went out of the city every morning, as soon as the gates were opened, and kept patrolling all day about the place: sometimes also making excursions further into the country, to see that there were no enemies lying in wait to surprize them.

**HEMERODROMI** were also a sort of couriers among the antients, who only travelled one day, and then delivered their packets or dispatches to a fresh man, who run his day, and so on to the end of the jour-

ney. See COURIER and EXPRESS.

**HEMI**, a word used in the composition of divers terms, signifying the same with semi, or demi, viz. one half; being an abbreviature of *ἡμισυς*, which signifies the same. The Greeks suppressed the last syllable of *ἡμισυς*, in the composition of words.

**HEMICRANIA**, in medicine, a species of head-ach, wherein only one half or side of the head is affected. See HEAD-ACH.

**HEMICYCLE**, in architecture, is defined by Daviler to be an arch forming a perfect semicircle. See the articles ARCH and BRIDGE.

To construct such an arch of hewn stone, they divide the semicircle into a certain number of equal parts, and fashion an equal number of vousoirs, which will complete the arch: however, that there may be no joint in the middle, where the key-stone should be, they always take care that the number of vousoirs be an odd one.

**HEMICYCLIUM**, in antiquity, a part of the orchestra in the antient theatres: but Scaliger observes, that this part was only used, when some person was supposed to be just arrived from sea, as in Plautus's Rudens.

**HEMICYCLIUM** also signified a kind of sun-dial; being a concave semicircle, the upper cusp of which looked to the north. On the middle of the hemicyclium stood a style, whereof the point that corresponded to the center of the hemicycle, represented the center of the earth; and its shadow, being projected on the concavity of the hemicycle, which represented the space between the two tropics, pointed out not only the declination of the sun, and the day of the month, but likewise the hour of the day.

**HEMINA**, in roman antiquity, a liquid measure which, according to Arbuthnot, was equal to half a wine-pint english measure; its contents being 2,818 solid inches. See the article MEASURE.

**HEMIOLIA**, or **HEMIOLIUS**, among antient musicians, a sort of proportion now called sesquialteral. See the article SESQUIALTERAL.

**HEMIONITIS**, in botany, a genus of the cryptogamia-muscorum class of plants, the fructifications of which are arranged into lines, sometimes branched, often uniting with and intersecting one another.

**HEMIOPE**, in antiquity, a flute with small holes. See the article FLUTE.

**HEMIPLEGIA**, or **HEMIPLEXIA**, among physicians, a palsy of one half of the body. See the article PALSY.

**HEMISPHERIA**, **LADY-COW**, in zoology, a genus of beetles, with clavated and entire antennæ; and whose thorax, with the exterior wings, which are margined, constitutes an hemispheric figure. There are a great many species of lady-cows, the most common of which is that with reddish wings, and seven black spots on them; an insect too well known to need farther description. See the article COCCINELLA.

**HEMISPHERE**, *hemisphærium*, in geometry, the half of a globe or sphere, when it is supposed to be cut through its center in the plane of one of its great circles. Thus the equator divides the terrestrial globe into the northern and southern hemispheres: in the same manner the meridian divides the globe into the eastern and western hemispheres; and the horizon into two hemispheres, distinguished by the epithets upper and lower. See the articles SPHERE and GLOBE.

The center of gravity of an hemisphere, is  $\frac{3}{8}$  of the radius distant from the vertex.

**HEMISPHERE** is also used to denote a projection of half the terrestrial globe, or half the celestial sphere, on a plane, and frequently called planisphere.

**HEMISPHEROIDAL**, in geometry, an appellation given to whatever approaches to the figure of an hemisphere, but is not exactly so.

**HEMISTICH**, *ἡμιστίχον*, in poetry, denotes half a verse, or a verse not completed.

Of this there are frequent examples in Virgil's *Æneid*; but whether they were left unfinished by design or not, is disputed among the learned; such are, *Ferro accincta vocat*, *Æn. II. v. 614.* And, *Italian non sponte sequor*, *Æn. IV. v. 361.*

In reading common english verse, a short pause is required at the end of each hemistich, or half verse.

**HEMITONE**, in music, the same with a semitone, or half note. See TONE.

**HEMITRITÆUS**, among physicians, a kind of intermitting fever, being a semitertian. See FEVER and TERTIAN.

**HEMLOCK**, *conium*, in botany. See the article CONIUM.

*Water Hemlock*, *cicuta*. See CICUTA.

**HEMP**, *cannabis*, in botany. See the article CANNABIS.

Hemp is a useful plant, purchased at a

dear rate from foreigners, when it might be cultivated among ourselves, to the great benefit of the nation in general. It delights in warm, sandy, or somewhat gravelly soil; but it must be somewhat rich, and of a good depth. The best seed is that which is brightest, and retains its colour and substance in rubbing. Three bushels will sow an acre; but the richer the land is, the thicker it must be sown, and the poorer it is, the thinner. The time of sowing it, is from the latter end of March, to the end of April, according as the spring falls out; but the earlier it is sown the better. If it be a dry season, great care must be taken to preserve it from birds.

The first season for gathering it is about Lammas, when a good part of it will be ripe; that is, the light summer hemp which bears no seed, and is called *fimble-hemp*. When it is ripe the stalks grow white, and the leaves fall downwards, turning yellow at the top: it must then be pulled up, dried, bound up in bundles as big as may be grasped in both hands, and laid by for use. Care must be taken not to break what is left standing, because it is to grow till near Michaelmas before it will be fit to gather: this is usually called *karle-hemp*. When it is gathered, lay it in the sun three or four days to dry, and then stack or house it till the seed be threshed out.

An acre of hemp, in the best land, commonly yields about two or three quarters of seed, which, with the hemp unwrought, is often worth from 5 to 8 l. but if wrought, from 10 to 12 l. but the *fimble-hemp* is not worth above half as much as the other.

As to the method of preparing it, after the seeds are threshed out of the heads, the stalks are laid up in bundles and steeped in a standing water, the cleaner it is the better; they are fastened to poles, and left to soak about fifteen days; and when the substance of the stalk is almost rotten, the bundles are taken out and well dried. But flax, instead of being steeped in water, is usually exposed alternately to the moist air of the night, and the heat of the sun, by which means it receives a finer colour.

When hemp and flax are well penetrated and afterwards completely dried, they are bruised by handfuls on a block, with a kind of mallet; all the *bulen*, which is the inward substance of the stem, flies off in shivers, by the force of the blows,

and nothing remains in the hands of the beater but the thin bark in large threads, through the whole length of the stem. This parcel of threads is afterwards hung on a perpendicular board, and bruised with a wooden beetle, in order to shake out all the little straws that may happen to remain of the *bulen*. All the gross parts are now separated from the stem, and the threads of the bark receive their perfection from the comb or hatchel.

The refuse of this combing, which consists of all the threads which are too thick, is called *tow*, for the use of which see the article *Tow*.

Hemp and flax are the materials of a variety of profitable manufactures; for besides linen, great quantities of ticken of all finenesses, sail-cloth, incle, tape, lacing, girtwip, cordage, twine, nets, and many other things are made of them: and they furnish multitudes of other manufactures, which employ the poor, and bring, by their exports, profit to the nation. But as we are under the necessity of importing very large quantities of hemp from foreign countries, the production of this article among ourselves, and in our plantations, cannot be too plentifully cultivated, nor too highly encouraged.

For the laws relating to hemp and flax, see the article *FLAX*.

**HEMPSTEAD**, a market-town of Hertfordshire, twenty-nine miles north-west of London.

**HEN**, *gallina*, in ornithology, though used in a general sense to signify any female bird, is more particularly restrained to those of the order of *gallinæ*. See the article *GALLINÆ*.

**HEN-BANE**, a plant called by botanists *hyoscyamus*. See *HYOSCYAMUS*.

**HEN-HARRIER**, in ornithology, the falco with a brown back, and a variegated, black, and brown tail. See the article *FALCO*.

This is a considerably large species, and is equal to a well grown pullet in size: the head is small, and somewhat flattened at the top; the beak is large, and very robust; it is broad and thick at the base, very much hooked, and extremely sharp at the point; the base of it is covered with a thick yellow membrane, in which are situated the nostrils, and there are a kind of black hairs resembling whiskers.

**HENDECAGON**, in geometry, a figure that hath eleven sides, and as many angles,



In fortification, hendecagon denotes a place defended by eleven bastions.

**HENEBOB**, a town of Britany, in France, twenty-two miles north-west of Vanes.

**HENLEY**, a market-town of Oxfordshire, situated on the river Thames, twenty miles south-east of Oxford, and thirty-five west of London.

**HENLEY** is also a market-town of Warwickshire, seven miles south-west of Warwick.

**HEN-MOULD**, among farmers, denotes a black spongy soil fitter for grazing than for corn.

In some places, indeed, they give the name of hen-mould to a rich black earth mixed with whitish streaks, which is exceeding fertile.

**HENNEBURG**, a town of Germany, in the circle of Franconia, and the capital of the county of Henneburg: east long.  $10^{\circ} 27'$ , and north lat.  $50^{\circ} 40'$ .

**HENOTICON**, in church-history, a decree or edict of the emperor Zeno, made at Constantinople, in the year 482, by which he pretended to reconcile all parties under one faith. It is generally agreed that Peter, patriarch of Alexander, and Acacius, patriarch of Constantinople, were the authors of this decree, and that their design was to compliment the emperor with a right of prescribing regulations in matters of faith. The emperor, by this decree, arrogated to himself the right of being head of the church. Pope Simplicius, however, in the year 483, condemned the henoticon, and cited Acacius, the chief promoter of it, to appear before him at Rome; but it was not entirely suppressed till the year 518.

**HENRICO**, a county of the colony of Virginia, in North America.

**HENRY**, or **CAPE-HENRY**, the south cape of Virginia, at the entrance of Chesapeake-bay: west long.  $74^{\circ} 50'$ , north lat.  $37^{\circ}$ .

**HENTING**, among farmers, a method of sowing immediately before the plough, by which it is pretended, a great deal of charge is saved. See **SOWING**.

**HENTING-FURROWS**, those turned from each other at the bottom, in ploughing ridges. See the article **PLOUGHING**.

**HEPAR**, the **LIVER**, in anatomy. See the article **LIVER**.

**HEPAR SULPHURIS**, **LIVER OF SULPHUR**, in pharmacy, according to Quincy, is thus made; take of flowers of sulphur, four ounces; salt of tartar in powder, an ounce and half: let them be well

mixed together, and then melted in an earthen dish, and kept constantly stirring till the mass has acquired a red colour, care being taken that it does not catch fire.

**HEPAR UTERINUM**, in anatomy, the same with placenta. See **PLACENTA**.

**HEPATIC**, in medicine and anatomy, any thing belonging to the liver.

**HEPATIC ALOE**. See the article **ALOE**.

**HEPATIC DUCT**. See **PORUS BILIARIUS**.

**HEPATIC FLUX**, a flux of the belly, of a very singular kind, and so rarely met with, that many authors have confounded the accounts of it with those of dysenteries and hæmorrhoidal fluxes. The signs by which it is known are these; the patient voids by the anus a liquid matter resembling water in which raw flesh had been washed; this is attended with pains and a sense of weight and tension in the abdomen, and spastic motions about the loins, which sometimes extend themselves to the right side, toward the region of the liver. In some patients there is no sensation of any pain, or any particular symptom; and, in some, a tenesmus is constantly joined with this voiding of a bloody fluid.

The persons subject to this disease are men, and those chiefly between the age of eighteen and forty, for the most part; as also such as are of a sanguineo-phlegmatic habit, and of a sedentary life.

The antients supposed this to be owing to a debility of the liver, which was not able, in this case, properly to attract or retain the blood; but it seems rather to belong to the hæmorrhoidal discharges, where, when pure and proper blood is not voided, this fluid comes in its place. This flux is not dangerous at the time; but when it is long continued, it will at length wear down the patient's strength, and bring on bad habits.

This disease, according to Junker, is to be treated in the same manner as the hæmorrhoidal discharge, when obstructed; and attemperating and abstergent medicines are to be given with gentle purges: rhubarb, in doses from a scruple to two or more, is to be given every day, for a long time: after this, nitre, tartarium vitriolatum, the alkaline salts of plants, as of worm-wood, with the absorbent powders, such as crab's eyes; and to these may be added decoctions of small centaury, and the like herbs.

**HEPATIC VEIN**. See **BASILICA**.

**HEPATICA**, **LIVER-WORT**, in botany,

a species of anemone. See the article **ANEMONE**.

This plant is chiefly used in obstructions of the liver and viscera; as also in the scab, gonorrhœa, and fever.

**HEPATITIS**, in medicine, the name of an acute, continuous, and inflammatory fever, in which nature frequently and forcibly propels the humours through the liver, seemingly with an intent to resolve and absterge congestions and stases of the blood in that viscus. See the article **INFLAMMATION**.

The hepatitis is distinguished from all other fevers, by the seat of it in the liver, and by its being, of all other fevers, the most fatal. It differs, however, in degree, some cases depending on a more superficial, some on a deeper and more internal inflammation of the liver. It usually seizes the patient with a chillness, which is succeeded by a violent heat, attended with an insupportable thirst: the patient perceives a severe and heavy pain on the right side, about the seventh or eighth rib; and is affected with a violent tightness of the breast, and difficulty of breathing; the extremities are very apt to become cold; there are frequent nausea, and reachings to vomit, and a bilious matter is thrown up: the urine for the first days is reddish and thick, and about the fourth day usually begins to deposit a sediment; the remaining part of it being however still turbid; a very peculiar symptom is, that the patient frequently changes colour, being at times pale, and at other times brownish or yellowish; the yellowness principally affecting the eyes and face. In cases where the matter in the liver comes to a suppuration, all the symptoms become more severe; the heat is greater, the respiration more difficult, &c. Finally, the breaking of the tumour is known by a sudden remission of the pain, with a terrible faintness and lowness of the spirits, and a hectic; and when the matter is discharged into the cavity of the abdomen, it is known by the swelling of that part. The general causes of the hepatitis are a plethora and a derivation of blood into the liver, which there forms congestions and stases: this is brought on by violent motions of the body, by violent strainings, by taking astingents in inflammatory fevers, and by driving back the matter in cutaneous eruptions; and, finally, by applying cold external medicines to the regions of the liver, or by

cupping upon the part. Bleeding is very proper in the beginning of the disease; and after this, the bowels are to be kept gently open, not by stimulating purges, but by emollient clysters, and the mildest and gentlest cathartics. The mixtura simplex is a very valuable medicine given several times a day; and in the intermediate hours the following powder is to be given: take purified nitre, and tartarium vitriolatum, each two drams; crab's eyes, and the jaw of a pike reduced to powder and sated with lemon juice, of each four scruples; diaphoretic antimony, a dram: the dose of this mixed powder is a scruple. In the mean time the region of the liver should be bathed externally with spirit of wine camphorated, impregnated with saffron. Above all things, rest, moderate warmth, and a placid regimen are to be observed.

**HEPATOSCOPIA**, in antiquity, that branch of divination, which predicted future events by inspecting the entrails of animals, but especially the liver. See the article **DIVINATION**.

**HEPATUS**, in ichthyology, a species of labrus, with the lower jaw longer than the upper, a forked tail, and transverse black lines on each side.

**HEPHÆSTIA**, in grecian antiquity, an athenian festival in honour of Vulcan, the chief ceremony of which was a race with torches.

It was performed in this manner: the antagonists were three young men, one of whom, by lot, took a lighted torch in his hand, and began his course; if the torch was extinguished before he had finished the race, he delivered it to the second; and he, in like manner, to the third: the victory was his, who first carried the torch lighted to the end of the race: and to this successive delivering of the torch, we find many allusions in ancient writers.

**HEPSETUS**, in ichthyology, a fish otherwise called atherina. It is a long and slender fish, with a forked tail, and its back variegated with black spots.

**HEPTACHORD**, in the ancient poetry, signified verses that were sung or played on seven chords, that is, on seven different notes. In this sense it was applied to the lyre, when it had but seven strings.

One of the intervals is also called an heptachord, as containing the same number of degrees between the extremes.

**HEPTAGON**, in geometry, a figure consisting of seven sides, and as many angles.

In fortification, a place is termed an heptagon, that has seven bastions for its defence.

**HEPTAGONAL NUMBERS**, in arithmetic, a sort of polygonal numbers, wherein the difference of the terms of the corresponding arithmetical progression is 5. One of the properties of these numbers is, that if they be multiplied by 40, and 9 be added to the product, the sum will be a square number. See **NUMBER**.

**HEPTAMERIS**, in music, the seventh part of a meris; being, according to M. Sauveur, the forty-third part of the octave. See the article **OCTAVE**.

**HEPTANDRIA**, in botany, a class of plants, the seventh in order, comprehending the plants that have hermaphrodite flowers, and seven stamina in each. See **FLOWER**, **STAMINA**, &c.

Of this class there are only two genera, the *esculus* and *trientalis*. See **ESEULUS** and **TRIENTALIS**.

**HEPTANGULAR**, in geometry, an appellation given to figures which have seven angles.

**HEPTARCHY**, a government of seven persons: also a state or country divided into seven kingdoms, and governed by seven independent princes; in which sense it is particularly applied to the government of South Britain, when divided amongst the Saxons.

**HEPTATEUCH**, the seven first books of the Old Testament, containing the pentateuch, or five books of Moses, and the books of Joshua and Judges.

**HEPHTHEMIMERIS**, in ancient poetry, a verse consisting of three feet and an half, or seven half feet.

It likewise denotes a *cæsura* after the third foot of a verse. See **CÆSURA**.

**HERACLEA**, a port-town of Romania, in european Turkey, situated on the Propontis, sixty miles south-west of Constantinople; it was once a great city: east long. 28°, and north lat. 41°.

**HERACLEIA**, an ancient festival celebrated in honour of Hercules by several states of Greece.

**HERACLEONITES**, a sect of christians, the followers of Haracleon, who refined upon the gnostic divinity, and maintained that the world was not the immediate production of the Son of God, but that he was only the occasional cause of its being created by the demiurgus. The heracleonites denied the authority of the prophecies of the Old Testament, maintaining that they were mere random

sounds in the air; and that St. John the Baptist was the only true voice, that directed to the Messiah.

**HERACLEUM**, in botany, a genus of the pentandria-digynia class of plants, the general flower of which is difform and radiated; the single flowers of the disc consist each of five equal petals, but those of the radius consist of five unequal petals: the fruit is elliptic, compressed, and striated on each side in the middle, and contains two oval compressed seeds.

To this genus belongs the *sphondylium*, or cow's parsnep of authors.

**HERACLIDÆ**, or *return of the HERACLIDÆ into Peloponnesus*, in chronology, a famous epocha, that constitutes the beginning of profane history; all the time preceding that period being accounted fabulous.

This return happened in the year of the world 2862, an hundred years after they were expelled, and eighty after the destruction of Troy.

**HERAIA**, an ancient greek festival observed at Argos and some other places, in honour of Juno, in which two processions were made to the temple of that goddess, one by men in armour; and a second, in which the priestesses of Juno was drawn in a chariot by white oxen, and on their arrival at the temple, they offered an hecatomb.

Another festival of this name was celebrated every fifth year at Elis, at which sixteen matrons were appointed to weave a garment for the goddess: there were also games, at which young virgins contended for the victory.

This name was also given to a solemn day of mourning kept at Corinth for Medea's children, who were buried in the temple of Juno Aſtræa.

**HERALD**, an officer at arms, whose business it is to declare war, to proclaim peace, to marshal all the solemnities at the coronation, christening, marriage, and funeral of princes, to blazon and examine coats of arms, &c.

Heralds were formerly held in much greater esteem than they are at present, and were created and christened by the king, who pouring a gold-cup of wine on their head, gave them the herald-name; but this is now done by the earl-marshal. They could not arrive at the dignity of herald without having been seven years pursuing; nor could they quit the office of herald, but to be made king at arms. See **POURSUIVANT**.

The

The three chief heralds are called kings at arms, the principal of which is Garter; the next is called Clarenceux, and the third Norroy; these two last are called provincial heralds. See *KING at arms*. Besides these there are six other inferior heralds, *viz.* York, Lancaster, Somerset, Richmond, Chester, and Windsor; to which, on the coming of king Geo. I. to the crown, a new herald was added, styled Hanover herald; and another, styled Gloucester king at arms.

The kings at arms, the heralds, and four poursuivants are a college or corporation, erected by a charter granted by Richard III. by which they obtained several privileges, as to be free from subsidies, tolls, and all troublesome offices. See the article *COLLEGE*.

**HERALDRY**, the art of armoury and blazoning, which comprehends the knowledge of what relates to solemn cavalcades and ceremonies at coronations, instalments, the creation of peers, nuptials, funerals, &c. and also whatever relates to the bearing of arms, assigning those that belong to all persons, regulating their right and precedencies in point of honour, and restraining those who have not a just claim, from bearing coats of arms that do not belong to them. See *BLAZONING*, *ARMS*, *SHIELD*, &c.

**HERAT**, a city of Persia, in the province of Chorassan: east long.  $61^{\circ}$ , and north lat.  $34^{\circ} 30'$ .

**HERB**, in pharmacy, an appellation given to the stalks and leaves of plants, especially such as are fleshy and succulent, and die away every year; but is also frequently used to denote the leaves alone.

The term herb, therefore, denotes the stalks and leaves, in contradistinction to the flowers, seeds, and roots. See *PLANT*, *FLOWER*, *FRUIT*, *ROOT*, &c.

Quincy gives the following directions for the gathering and preserving of herbs. They should be gathered just when beginning to flower, as being then in greatest perfection; and this must be done when there is no rain or dew upon them, otherwise they will be apt to turn black in drying. They ought to be dried in the shade, as too great heat exhales their moisture too fast, and destroys their beautiful verdure. The fresher they are used the better, though some may be kept much longer than others. So long as the fresh colour they dry with continues, they may be trusted in medicine, but no longer. They are much better for de-

coction and distillation when dried than green, because their saline and volatile parts very difficultly mix with a menstruum, until their native phlegm be evaporated.

**HERB-TRUELOVE**, *herba paris*, in botany. See the article *PARIS*.

**HERBAGE**, in law, signifies the pasture provided by nature for the food of cattle; also the liberty to feed cattle in the forest, or in another person's ground.

**HERBAL**, in literary history, a book that treats of the classes, genera, species, and virtues of plants. See the articles *PLANT* and *BOTANY*.

**HERBAL** is sometimes also used for what is more usually called *hortus ficcus*. See the article *HORTUS*.

**HERBALIST**, the author of an herbal, or one who is skilled in plants.

**HERBE**, in the french academies, a reward, or some good stuff, given to a horse who has worked well in the manege.

**HERBORG**, a town in the circle of the Upper Rhine, and territory of Nassau: east long.  $8^{\circ} 15'$ , and north lat.  $50^{\circ} 36'$ .

**HERCINIAN FOREST**, a forest which antiently extended the whole length of Germany and Bohemia, some remains of which are still in being, *viz.* the Black Forest, Odenwald near Heidelberg, Stigewald in Wurtzburg and Bamberg, and Hartswald in Brunwic.

**HERCOLE**, a port-town of Tuscany, on the coast called *Stato del Presidii*: east long.  $12^{\circ}$ , and north lat.  $42^{\circ} 25'$ .

**HERCOLE** is also a little island, near the town of the same name.

**HERCULES**, in astronomy, a constellation of the northern hemisphere, said to contain from 28 to 95 stars.

**HERCULES-PILLARS**, in antiquity, a name given to mount Calpe in Spain, near Gibraltar, on the european side of the streights, and mount Avila on the african side.

**HERCULEUS MORBUS**, the *EPILEPSY*, in medicine. See *EPILEPSY*.

**HERD**, a company of eatable cattle of the larger sort, as cows, oxen, swine, deer, &c. also of wild beasts.

**HEREDITAMENTS**, whatever immoveable things a person may have to himself and his heirs, by way of inheritance; and which, if not otherwise bequeathed, descend to him who is next heir, and not to the executor, as chattels do.

This word extends to whatever is inheritable, be it real, personal, or mixed: and in conveyances, by the grant of hereditaments,

ments, manors, houses, lands, rents, &c. will pass.

**HEREDITARY**, an appellation given to whatever belongs to a family by right of succession, from heir to heir.

Some monarchies are hereditary, and others elective; and some hereditary monarchies descend only to the heirs male, as in France; but others, to the next of blood, as in Spain, England, &c. Thus the dominions of the emperor are distinguished into hereditary, which are those he derives from his ancestors by right of inheritance, and those he enjoys in quality of emperor by virtue of his election. Hereditary is also applied to offices and posts of honour annexed to certain families; thus the office of earl-marshal is hereditary in the family of Howard.

Hereditary is also figuratively applied to good or ill qualities, supposed to be transmitted from father to son: thus we say, virtue and piety are hereditary virtues in such a family: and that in Italy the hatred of families is hereditary. And indeed the gout, the king's evil, madness, &c. may really be hereditary diseases.

**HEREFORD**, the principal city of Herefordshire, situated on the river Wye, twenty-four miles north-west of Gloucester, and one hundred and twenty west of London: west long.  $2^{\circ} 42'$ , and north lat.  $52^{\circ} 6'$ .

It sends two members to parliament.

**HERESY**, the crime of obstinately persisting in opinions, that are contrary to the fundamentals of religion.

There is no law that expressly determines this offence, it being impossible to set down all the particular errors that may be said to be heretical, and in relation to which so many disputes have arisen; in general, however, those opinions that were supposed to be condemned by the scriptures, or the four first general councils, have been accounted heresy.

Heresy was antiently treason, and punished by burning the offender; but he forfeited neither lands nor goods, because the proceedings against him were *pro salute animæ*. At present, all punishments of death, and the old statutes which gave power to arrest or imprison persons for heresy, are repealed: though, by the common law, an obstinate heretic, being excommunicated, may be still imprisoned, on the writ *de excommunicato capiendo*, till he makes satisfaction to the church. And persons denying the truth of the christian religion, or the divine authority

of the scriptures, &c. are liable, for the second offence, to three years imprisonment, by 9 & 10 Will. III. cap. xxxii.

**HERETIC**, a general name for all such persons, under any religion, but especially the christian, as profess or teach religious opinions contrary to the established faith, or to what is made the standard of orthodoxy. The laws both of church and state were antiently very severe against those who were adjudged to be heretics: the principal of which were, first, the general note of infamy affixed to all heretics in common. Secondly, all commerce forbidden to be held with them. Thirdly, the depriving them of all offices of profit and dignity. Fourthly, the rendering them incapable of disposing of their estates by will, or of receiving estates from others. Fifthly, imposing on them pecuniary mulcts. Sixthly, proscribing and banishing them. Seventhly, inflicting corporal punishment on them, such as scourging, &c. before banishment. Besides these laws, which chiefly affected the persons of heretics, there were others which tended to the extirpation of heresy, such as those which forbade heretical teachers to propagate their opinions in public or private: those which denied the children of heretical parents their patrimony and inheritance, unless they returned to the church: such as ordered the books of heretics to be burnt. There were many other penal laws against heretics, from the time of Constantine to Theodosius junior, and Valentinian III. But the few already mentioned may be sufficient to give an idea of the rigour with which the empire treated such persons, who held or taught opinions contrary to the faith of the catholic church; whose discipline towards heretics was no less severe than the civil laws: but since these early times, the most horrid deaths, and the most excruciating tortures, have been invented. For the laws of England in relation to heretics, see the preceding article.

**HERISSON**, in fortification, a beam armed with a great number of iron-spikes, with their points outwards, and supported by a pivot, on which it turns.

These serve as a barrier to block up any passage, and are frequently placed before the gates, and more especially the wicket-doors of a town or fortress, to secure those passages, which must of necessity be often opened and shut.

**HERK**, a town of Germany, in the bishoprick of Liege, situated on a river of

of the same name, near its confluence with the Demer: east long.  $5^{\circ} 20'$ , and north lat.  $51^{\circ}$ .

**HERLING**, a market-town of Norfolk, twenty miles south-west of Norwich.

**HERMÆ**, among antiquarians, statues of the god Mercury, made of marble, and sometimes of brass, without arms or feet, and set up by the Greeks and Romans in the cross-ways.

Antiquity likewise furnishes us with compound hermæ, or statues of Mercury joined with some other deity, as Herm-Athena, or Mercury and Minerva; Herm-Hercules, or Mercury and Hercules; Herm-Eros, or Mercury and Cupid: and so of others.

**HERMÆA**, in antiquity, ancient greek festivals, in honour of the god Hermes, or Mercury. One of these was celebrated by the Pheneatæ, in Arcadia; a second by the Cyllenians, in Elis; and a third by the Tanagræans, where Mercury was represented with a ram upon his shoulder, because he was said, in a time of plague, to have walked thro' the city in that posture, and to have cured the sick; in memory of which, it was customary at this festival, for one of the most beautiful youths in the city, to walk round the walls, with a ram upon his shoulder.

A fourth festival of the same name was observed in Crete, when it was usual for the servants to sit down at the table while their masters waited: a custom which was also practised at the roman saturnalia.

**HERMANNIA**, AFRICAN MARSH-MALLOWS, in botany, a genus of the monadelphii-pentandria class of plants, with a roseaceous flower, the petals of which are semitubular at the base; the fruit is a roundish capsule, containing a great many small seeds.

**HERMANSTAT**, the capital city of Transilvania, subject to the house of Austria: east long.  $24^{\circ}$ , north lat.  $46^{\circ} 32'$ .

**HERMAPHRODITE**, a person of both sexes, or who has the parts of generation both of male and female.

It is now generally allowed, that there is no such thing as a true hermaphrodite; most, if not all those who pass for such, being mere women, whose clitoris is grown to an enormous size, and the labia pudendi become unusually tumid.

Among the insect-class of animals, indeed, hermaphrodites are very frequent: such are worms, snails, leeches, &c.

**HERMAPHRODITE FLOWERS**, among botanists. See FLOWER.

**HERMATHENA**, among antiquarians, a statue representing Mercury and Minerva both in one. See HERMÆ.

**HERMES**, or HERMÆ. See HERMÆ.

**HERMETIC**, or HERMETICAL, an appellation given to whatever belongs to chemistry, from Hermes Trismegistus, who is supposed to have been its inventor.

**HERMETICAL PHILOSOPHY**, that which undertakes to solve the various phenomena of nature, from the chemical principles, salt, sulphur, and mercury.

**HERMETICAL SEAL**, among chemists, a method of stopping glass-vessels, used in chemical operations, so closely, that the most subtle spirit cannot escape through them.

It is commonly done by heating the neck of the vessel in a flame, till ready to melt, and then twisting it closely together with a pair of pincers. Or, vessels may be hermetically sealed, by stopping them with a glass plug, well luted; or, by covering the vessel with another ovum philosophicum.

**HERM-HARPOCRATES**, in antiquity, a compound statue of Mercury and Harpocrates. See the article HERMÆ.

**HERMIT**, a devout person retired into solitude to be more at leisure for contemplation, and to disencumber himself from the affairs of the world.

An hermit is not reputed a religious, unless he has made the vows.

Paul the hermit is usually reckoned the first: though St. Jerom at the beginning of the life of that saint, says it is not known who was the first. Some go back to St. Anthony, some to John the Baptist, and others to Elias. However, several of the ancient hermits, though they lived in deserts, had nevertheless numbers of religious accompanying them.

There are also several orders and congregations of religious distinguished by the title of hermits; as the hermits of St. Augustin, of St. John the Baptist, of St. Jerom, of St. Paul, of St. James de Montlio, of St. William, of St. Benedict of Montefabalo, &c.

**HERMIT**, in zoology, the long-tailed squilla, with a soft tail, and the right claw the largest. See the article SQUILLA.

This grows to two inches and a half in length; the legs are slender and long, and the anterior ones have claws on them like the common crabs.

**HERMODACTYLS**, in pharmacy, a root supposed to be that of the plant colchicum. See the article COLCHICUM.

Hermō-

**Hermodyctyls** are brought us from Egypt and Syria, where the people eat them to make themselves fat. They use them medically, while fresh and just taken out of the earth, as a vomit and purge. The dried roots, as we have them in the shops, are a gentle purge, and have the credit of being peculiarly good in rheumatic disorders. The dose in powder is from a scruple to a dram, or more, but they are so weak a purge as seldom to be given alone: their proper correctives are the spices, ginger, cloves, and the like.

**HERMON**, a mountain on the east of Syria and Palestine, in Asia.

**HERNANDIA**, in botany, a genus of plants, the characters of which are not perfectly ascertained; the corolla of the male as well as the female flower, is divided into six segments: there is no pericarpium, the cup is very large, inflated and roundish, and intire at the mouth: the seed is an oval, sulcated, unilocular nut; the nucleus is globose.

**HERNGRUNT**, a town of Upper Hungary, situated north of Buda, near the Carpathian mountains: east long.  $19^{\circ} 20'$  north lat.  $48^{\circ} 47'$ .

**HERNIA**, in medicine, a preternatural tumour formed in the abdomen, particularly in the navel, inguen, and scrotum, by a protuberance of the intestines or omentum, and usually known by the name of rupture.

These tumours differ first, according to their place or situation: those formed at the navel are called *omphalocele*, or *exomphalus*. See *EXOMPHALUS*.

A hernia in the groin is called *bubonotele*, and that of the scrotum, *oscheocele*, &c. See the article *BUBONOCELE* and *OSCHEOCELE*, &c.

Hernias are also distinguished from the body or surface contained in, or forming, the tumour: when from a protuberance of the intestines, a hernia is termed *enterocele*; when from the omentum, *epiplocele*; if from flatulæ, *pneumatocele*; and if from water, *hydrocele*, &c. See the articles *ENTEROCELE*, *EPIPOCELE*, *PNEUMATOCELE*, *HYDROCELE*, &c.

Hernias are also distinguishable from circumstances less remarkable, as from the size, being either small, large, or enormous; from their consistence, being either hard, soft, fixed or moveable, capable of being returned into the abdomen, or not; which latter are called ad-

hesive ruptures: sometimes the parts prolapsed are so confined by stricture and inflammation, that the flatus and fæces cannot be returned, which kind of ruptures are called *incarcerated*: some are attended with pain; others without; or with sickness, vomiting, and other bad symptoms.

**HERNIA HUMORALIS**, a painful and inflammatory tumour, of one or both testicles, arising generally from a suppression of a virulent running in a gonorrhœa, or from too strong and stimulating cathartics, especially if the patient happens to take the least cold during their operation. See *GONORRHOEA*.

The cure of this symptom, according to Turner, must commence with bleeding; a bag-truss must be immediately provided, which may support the weight of the tumour, and contain and secure the proper applications: among which none excels a cataplasm of bean-meal, with simple oxymel; adding to it a little of the oil of roses, or ointment of elder, to preserve it from hardening and drying. During these applications, forbear all restraining or balsamic medicines, and purge the patient briskly with calomel and *pilulæ ex duobus*: but particular care must be taken that he gets no cold, by which method the swelling is usually in a few days dispersed, and the running always appears, which must be carried off by the same, or the like cathartics repeated at proper intervals. But if, notwithstanding, the pain and fluxion still increase with inflammation, threatening an abscess, the patient must be vomited with the turpeth mineral; such intervals being observed as may prevent any soreness of his chops, till the tumour subsides: then purge off the reliques; when, if any schirrhous hardness should remain, you may endeavour to disperse it with the *emplastrum diaphysuris*, the *emplastrum de ranis cum mercurio* & *de cicuta cum ammoniaco*, *ex ammoniaco*, the *diagalbanum*; or with suffumigation with vinegar.

**HERNIARIA, RUPTURE-WORT**, in botany, a genus of the *petandria-digynia* class of plants, having no corolla: the fruit is a small capsule placed in the bottom of the cup, covered, and hardly splitting; the seed is single, ovato-acuminated, and smooth.

This plant is of a refrigerating and drying quality. Its principal use is in curing an hernia; in wasting the stone

in the kidneys, and bladder; in inciding mucosities of the stomach and other parts, and bringing them away; in evacuating bile and water, and consequently curing the jaundice.

**HERO**, in the antient mythology, a great and illustrious person, of a mortal nature, though supposed by the populace to partake of immortality; and, after his death, placed among the number of the gods.

Heroes were persons partly of divine and partly of human extraction, being begot between a deity and a mortal, and coincides with what we otherwise call a demi god; such was Hercules, who was the son of Jupiter by Alcmena: accordingly Lucian describes a hero to be a medium between a god and a man, or rather a composition of both.

**HERO** is also used in a more extensive sense for a great, illustrious, and extraordinary personage; particularly in respect of valour, courage, intrepidity, and other military virtues.

F. Bouhours makes this distinction between a hero and a great man, that the former is more daring, fierce, and enterprising; and the latter more prudent, thoughtful and reserved. In this sense we say, Alexander was a hero, and Julius Cæsar a great man.

**HERO** of a poem, or romance, is the principal personage, or character therein. See the article **CHARACTER**.

The hero of the *Iliad* is Achilles; of the *Odysses*, Ulysses; of the *Æneid*, Æneas; of Tasso's *Jerusalem*, Godfrey of Bulloign; of Milton's *Paradise Lost*, Adam; though Mr. Dryden will have the devil to be Milton's hero, in regard he gets the better of Adam, and drives him out of *Paradise*.

Many of the critics find fault with the hero of the *Æneid*, for being too delicate, wanting the fire, firmness, and uncontrollable spirit, remarkable in the hero of the *Iliad*. Piety, tenderness, and submission to the gods, are virtues of the middle class of mankind; they do not strike enough for a hero who is to be the instrument of such notable exploits. In answering to this, F. Bossu observes, that Æneas's character was not to be formed on the model either of Achilles or Ulysses; nor to be of the same kind with them, as the fable and design of the *Æneid* were very different from those of the *Iliad* and *Odysee*. Virgil's design was to persuade the Romans to re-

ceive a new form of government, and a new master; who must have all the qualities requisite for the founder of a state, and all the virtues which make a prince beloved.

Virgil was restrained in his choice; his hero was to be of the genius of Augustus. The characters of Homer's two heroes, as being directly contrary to his design, he has thrown upon Turnus and Mezentius, who are the counter-parts to his hero. It is disputed whether it be necessary, that the hero of an epic poem be a good and virtuous man. Bossu maintains the negative. Between a hero in morality, and a hero in poetry, the same distinction may be made as between moral and poetical goodness. Hence, as the manners of Achilles and Mezentius are poetically as good as those of Ulysses and Æneas, so these two cruel and unjust men are as regular poetical heroes, as these two just, wife, and good men.

Whatever Aristotle may say in his book of morality, in his poetics he speaks another language. The hero of a poem, he observes, must neither be good nor bad, but between both: he must not be superior to the rest of mankind by his virtue and justice, nor inferior to them by his crimes and wickedness. In effect, reason, the nature of the poem, which is a fable, the practice of Homer, and the rules of Aristotle and Horace agree that it is so far from being necessary, that a hero be a faultless man, that it is not necessary he be an honest man.

It is likewise disputed, whether, the catastrophe is necessarily to leave the hero happy, or whether it be allowable to leave him unhappy.

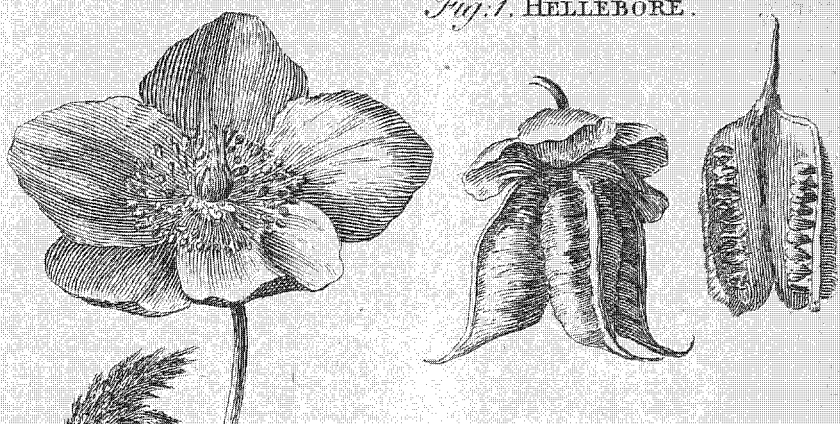
The general practice of the heroic poets stand for the affirmative. In tragedy, according to Aristotle unhappy catastrophes are preferable to happy ones, and always much better received among the antients.

It is otherwise in the epopeia; but yet this does not exclude all unhappy conclusions. If the poet proposed his hero as a pattern of perfection for imitation, the misfortunes falling on him would suit very ill with the design; but this was doubtless the farthest thing from the intentions of the great masters of the epopeia. The only reason perhaps for this uniform practice of the poets is, that an epic poem containing an action of more extent than that of tragedy, the reader would not be so well satisfied if, after

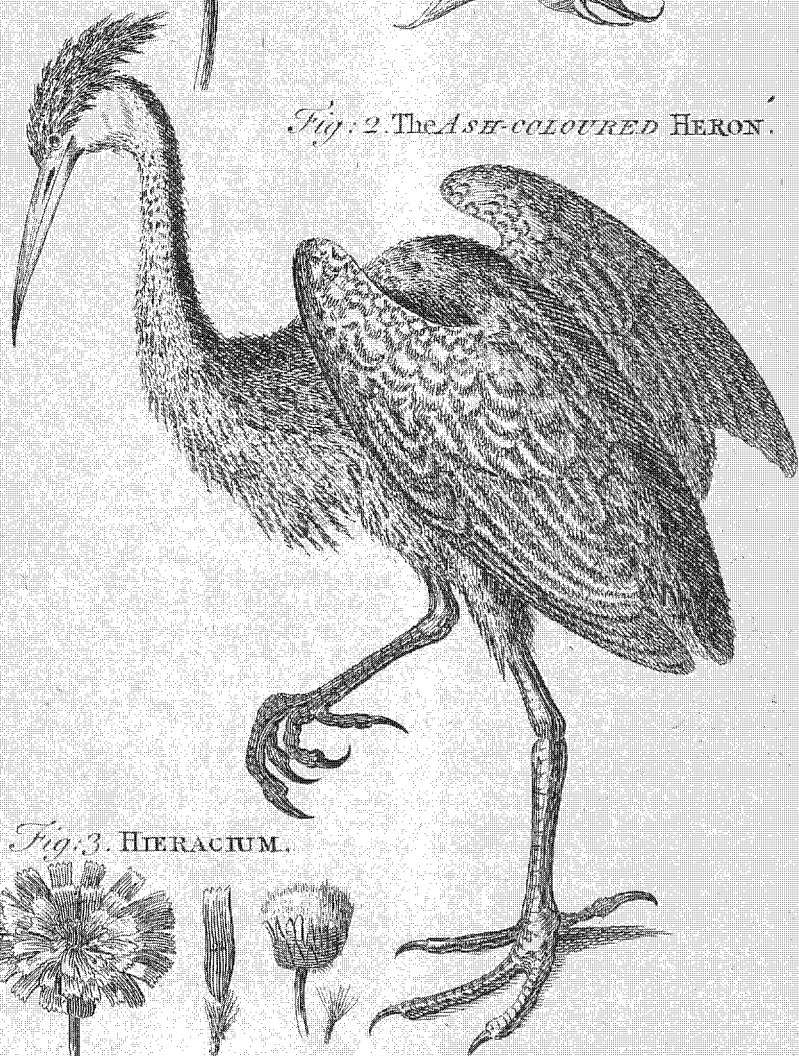




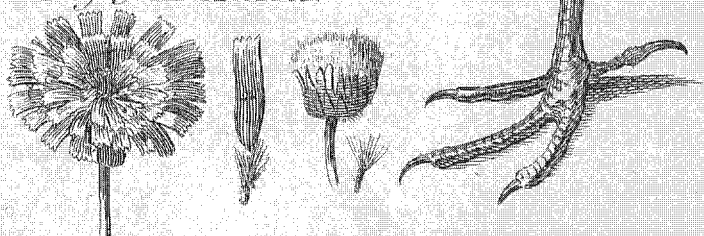
*Fig. 1. HELLEBORE.*



*Fig. 2. The ASH-COLOURED HERON.*



*Fig. 3. HIERACIUM.*



after so many difficulties as the hero is brought to struggle with, he should not at last be brought off, but perish miserably.

**HEROIC**, something belonging to a hero, or heroine : thus,

**HEROIC AGE**, that age or period of the world wherein the heroes are supposed to have lived. The heroic age coincides with the fabulous age.

**HEROIC POEM**, that which describes some extraordinary enterprize; being the same with epic poem. See **EPIC**.

**HEROIC VERSE**, that wherein heroic poems are usually composed; or it is that proper for such poems. In the greek and latin, hexameter verses are usually denominated heroic verses, as being alone used by Homer, Virgil, &c. See the article **HEXAMETER**.

Alexandrine verses of twelve syllables were formerly called heroic verses; but later writers use verses of ten syllables.

**HEROIN**, a woman of an heroic spirit, or who makes the principal personage in an heroic poem. See **HERO** and **POEM**.

**HERON**, in ornithology, a bird of the arde-kind, with a hanging crest.

The common heron is a tall bird, measuring more than four feet from the point of the beak to the tip of the toes. Its head is covered with short white feathers; only from the hinder parts, there hangs a crest of very long black feathers; the upper part of its body is of a dusky bluish grey; the under part white, and the thighs yellowish.

The ash coloured heron from Hudson's Bay differs from the common heron, in being something bigger, of a browner ash-colour on its back, and in having no white feathers on its forehead. See plate **CXXXI**. fig. 2.

**HERPES**, in medicine, a bilious pustle, which breaking out in different manners upon the skin, accordingly receives different denominations.

If they appear single, as they frequently do in the face, the base is inflamed, and the top pointed; and having discharged a drop of matter, the redness and pain go off, and they dry away. There is another sort more corrosive and of greater malignity, when a cluster of pustles rise in a ring, accompanied with smart, and sometimes with great itching: this species is termed *serpigo*, and vulgarly the *tetter*, or *ring-worm*. It seizes the face, hands, and other parts of the body,

is of an obstinate nature, eating into the skin; and forsaking the place where it first appears, it spreads its taint into the adjacent parts. It neither forms matter, nor comes into digestion; but when rubbed, will sometimes emit a thin, sharp, watery, humour, and excites smart, heat, and itching.

Another kind of this disease appears in large clusters upon the neck, breast, loins, hips, and thighs, attended with a slight fever and inflammation: the heads are white and mattery, which are succeeded by a small round scab, resembling millet-seed, whence its name of *herpes miliaris*; and is commonly called *shingles*. Another species, from its degree of virulence and corrosion, is named *herpes exedens*, or *herpes depascens*. See the article **ULCER**.

The simple bilious pustle, which rises in the face, requires but little assistance from medicine; for though it burns, smarts, or itches a day or two, yet it naturally comes to a head, soon dries, and disappears.

The *serpigo* is sometimes very difficult to be exterminated, and after it appears dead, it will at certain seasons of the year, obstinately break out again.

Tho' bleeding at first is by some condemned, yet repeated purging, especially with cholagogue medicines is universally approved: these not succeeding, recourse must be had to mercurials, especially if there be the least suspicion of any old venereal taint remaining in the blood. Having removed the *cacochymy*, the physician may proceed to topics. Ambrose Paré, after a general evacuation, prescribes the following. Take of powder of oak-galls, pomegranate-peel, balsamines, and armenian bole, each half an ounce; of rose-water, half an ounce; of the sharpest vinegar, half an ounce; of goose-grease, and oil of myrtles, each six drams; of turpentine, half an ounce: make up into an ointment for use. Barbet imputes the cause of the herpes rather to the lymph, than to the bile and salt phlegm, blamed by the antients. In the military eruptions, called *shingles*, great care must be taken that the bilious *cacochymy* is purged off before the use of topics: the internal prescription for this purpose is the same with that in the *erysipelas*. See the article **ERYSIPÉLAS**. When the pustles are all ripened, their heads may be cut off with a pair of

scissars, and the humours absorbed with a soft rag, to prevent farther corrosion. Then a cerate of oil and wax may be laid over the parts, and kept on with a bandage, to prevent the pustles sticking to the dry linen. See **ERUPTION**.

**HERRING**, in ichthyology, a species of clupea, with the lower jaw longest, and without any black spoils. It is from five to eight inches in length, and between one and two in breadth. However, its size is far from being certain; since it varies not only on account of age, but according to the seas and places where it is caught. The back is of a dusky bluish colour, and is more blue in spring than any other times; the sides and the belly are of a silvery white; the fin on the back stands near the middle, and is of a whitish colour, and has nineteen rays; the pectoral fins are whitish, stand low, and have each eighteen rays; the ventral fins are very small and white; the pinna ani is near the tail, and has eighteen rays; the tail is of a greyish colour, forked, and furnished with eighteen rays.

We have been designedly particular in the description of this useful fish; the manner of fishing and curing which is delivered under the article **FISHERY**.

**Barrelling of HERRINGS**. See the article **Herring FISHERY**.

**HERRING-BUSS**, in naval affairs. See the article **BUSS**.

**HERSE**, in fortification, is a lattice or portcullice, made in the form of a harrow, and stuck full of iron-spikes.

It is usually hung by a rope, fastened to a moulinet, which is cut in case of surprise, or when the first gate is broken with a petard, to the end that it may fall and stop up the passage of the gate, or other entrance of a fortress.

These hersees are also often laid in the roads, with the points upwards, to incommode the march both of the horse and infantry.

**HERSILLAN**, in the art of war, is a strong plank or beam, about ten or twelve feet long, stuck full of spikes on both sides, and also used to incommode the march of the infantry or cavalry.

**HERSTAL**, a town of Germany, in the bishopric of Liege, situated three miles north of the city of Liege: east long.  $5^{\circ} 36'$  north lat.  $50^{\circ} 42'$ .

**HERTFORD**, or **HARTFORD**. See the article **HARTFORD**.

**HERWERDEN**, a town of Westphalia, subject to the king of Prussia; and remarkable for its protestant-nunnery: east longitude  $8^{\circ} 15'$ , and north latitude  $52^{\circ} 12'$ .

**HESDEN**, a town of Artois, near the confines of Picardy, and twenty miles south-west of St. Omers.

**HESPER**, *hesperus*, in astronomy, an appellation given to the planet Venus, when she sets after the sun. See **VENUS**.

**HESPERIDES**, in antiquity, the daughters of Hesperus, brother of Atlas, who kept a garden full of golden apples, guarded by a dragon: but Hercules having laid the dragon asleep, stole away the apples. Others say, that they kept sheep with golden fleeces that were taken away by Hercules.

Some think the hesperides were the daughters of a rich merchant of Miletus, who, on account of their beauty, were guarded by a man called Dragon; and that Hercules, by killing or bribing him, got them away.

**HESPERIDES** was also a name antiently given to the Cape Verd Islands. See the article **Cape VERD**.

**HESPERIS**, **DAME'S VIOLET**, in botany, a genus of the tetradynamia siliquosa class of plants, the corolla of which consists of four cruciform petals, of an oblong figure, of the length of the cup, a little reflex, and ending in small unguis: the fruit is a long pod, plane, compressed, striated, bilocular, bivalve, containing several oval, compressed seeds.

This plant is antiscorbutic, and diaphoretic, and very serviceable in the asthma, cough, and convulsions: the outward use of it is recommended against inflammations, cancers, a gangrene, sphacelus, and contagious diseases.

**HESSE-CASSEL** landgraviate, including Wetteravia, is a circle of the Upper Rhine, bounded by Westphalia and Brunswick on the north; by Franconia and Saxony on the east; by the river Maine on the south, and by another part of Westphalia, and the electorate of Mentz and Triers on the west: it is subject to the king of Sweden.

**HESSE-DARMSTAT**, is bounded by the river Maine, which divides it from Hesse-Cassel on the north; by the same river on the east; and by the Palatinate on the south and west.

**HETEROCLITE**, among grammarians, one of the three variations in irregular nouns,

nouns, and defined by Mr. Ruddiman, a noun that varies in declension; as *boc vas, vasis; hæc vasa, vasorum*.

Other grammarians take the word heteroclite in a larger sense, applying it to all irregular nouns. See ANOMALOUS.

The heteroclite nouns properly so called, or, according to the definition, are only three, *viz. vas, jugerum, and domus*.

**METERODOX**, in polemical theology, any thing contrary to the faith and doctrines of a true church.

**HETERODROMUS VECTIS**, in mechanics, a lever, wherein the fulcrum, or point of suspension, is placed between the power and the weight. See LEVER. In this kind of lever, the weight is elevated, or raised, by the descent of the power, and *vice versa*.

**HETEROGENEITY**, in physiology, that quality or property of bodies, which denominates a thing heterogeneous. See the next article.

The word is also used for the heterogeneous parts themselves. In which sense the heterogeneities of a body are the same thing with the impurities thereof.

Heterogeneity is a word of a very lax signification, and is brought by the chemists to serve almost for any thing they do not understand, so that the disagreement or inaptitude to mixture in any body is imputed to the heterogeneity of their parts.

**HETEROGENEOUS**, or **HETEROGENEAL**, something that consists of parts of dissimilar kinds, in opposition to homogeneous. See HOMOGENEOUS.

**HETEROGENEOUS**, in mechanics, such bodies whose density is unequal in different parts of their bulk; or they are such whose gravities in different parts are not proportionable to the bulks thereof: whereas bodies equally dense or solid in every part, or whose gravity is proportionable to their bulk, are said to be homogeneous.

**HETEROGENEOUS LIGHT**, is, by Sir Isaac Newton, said to be that which consists of rays of different degrees of refrangibility: thus the common light of the sun or clouds is heterogeneous; being a mixture of all sorts of rays.

**HETEROGENEOUS NOUNS**, one of the three variations in irregular nouns; or such as are of one gender in the singular number, and of another in the plural, as *boc cælum, bi cæli*. Heterogeneous, under which are comprehended, mixed nouns, are six-fold, 1. Those which are of the

masculine gender in the singular number, and neuter in the plural, as *bic tartarus, hæc tartara*. 2. Those which are masculine in the singular number, but masculine and neuter in the plural, as *bic locus, bi loci, & hæc loca*. 3. Such as are feminine in the singular number, but neuter in the plural, *hæc carbasus, & hæc carbasa*. 4. Such nouns as are neuter in the singular number, but masculine in the plural, as *boc cælum, bi cæli*. 5. Such as are neuter in the singular, but neuter and masculine in the plural, as *boc rastrum; bi rastri, & hæc rastra*; and, 6. Such as are neuter in the singular, but feminine in the plural number, as *boc epulum, hæc epulæ*.

**HETEROGENEOUS NUMBERS**, mixed numbers consisting of integers and fractions. See INTEGER and FRACTION.

**HETEROGENEOUS QUANTITIES**, are those which are of such different kinds, as that one of them taken any number of times, never equals or exceeds the other.

**HETEROGENEOUS SURDS**, are such as have different radical signs, as  $\sqrt[3]{aa}$ ,  $\sqrt[5]{bb}$ ,  $\sqrt[3]{9}$ ,  $\sqrt[7]{18}$ , &c. See SURD.

If the indices of the powers of the heterogeneous surds be divided by their greatest common divisor, and the quotients be set under the dividends; and those indices be multiplied crosswise by each others quotients; and before the products be set the common radical sign  $\sqrt{\phantom{x}}$ , with its proper index; and if the powers of the given roots be involved alternately, according to the index of each others quotient, and the common radical sign be prefixed before those products, then will those two surds be reduced to others, having but one common radical sign. As to reduce

$$\begin{array}{l} \sqrt[2]{aa} \text{ and } \sqrt[4]{bb} \\ 2) \sqrt[2]{aa} \quad (2 \sqrt[4]{bb} \quad \overset{1 \times 2}{\sqrt[4]{bb}} \sqrt[4]{aaaa} \end{array}$$

**HETEROPYRÆ**, in natural history, a genus of fossils, of the class of the siderochita, composed of various crusts, surrounding a nucleus of a different substance from themselves, and often loose and rattling in them. See the article SIDEROCHITA.

Of this genus Dr. Hill reckons seven species. 1. The hard heteropyra, with brown and purplish crusts, and a whitish green nucleus, being a very beautiful fossil of a smooth equal texture, considerably compact and close, generally determinate and regular in shape and size,

in

in form of an oblong oval figure, and about an inch in length, and half an inch in diameter. 2. The rough purplish heteropyra, containing a large nucleus of a very light earth. 3. The misshapen heteropyra, with ferrugineous, red, and dusky, yellow crusts, and a greenish, white nucleus. 4. The yellow, brown, and black-crusted heteropyra, with a whitish nucleus, being about four inches in length, and three in breadth, and two and a half in thickness, of an oblong form, a close compact texture, and very heavy. 5. The yellow, ferrugineous, and purplish-crusted heteropyra, with a pale yellow nucleus, from four to twelve inches in length, and about the third of its length in breadth, and nearly the same in thickness. 6. The coarse, yellow, and brown heteropyra, with a brownish yellow nucleus of an orbicular form, and between one and two inches in diameter. 7. The coarse heteropyra, with brown, black, and orange-coloured crusts, and a yellow nucleus, being of an oblong form, and about an inch and a half in length.

**HETEROSCI**, in geography, a term of relation denoting such inhabitants of the earth as have their shadows falling but one way, as those who live between the tropics and polar circles, whose shadows at noon, in north latitude, are always to the northward; and in south latitude, to the southward.

Thus we who inhabit the northern temperate zone, are heteroscii with regard to those who inhabit the southern temperate zone, and they are heteroscii with respect to us. Hence it follows, that only the inhabitants of the two temperate zones are heteroscii, though in reality there is always one part of the torrid zone whose inhabitants are heteroscii with respect to those of the rest, and with regard to those of one of the temperate zones, except at the time of the solstice, and even at this time all of the torrid zone are heteroscii with regard to those of one of the temperate zones; but as the people of the torrid zone have their shadows now on this, and then on that side, they are called amphiscii. See **AMPHISCII**.

**HETEROUSIANS**, a name composed of *heteros*, other, and *hoia*, substance, being given to a sect of Arians, who did not believe that the son of God was of a substance like to that of the father, which was the opinion of another branch of the Arians, who were from thence called hemo-

ousians; but that he was of another substance, different from that of the father.

**HEUCHERA**, in botany, a genus of the pentandria-digynia class of plants, the corolla whereof consists of five petals inserted into the edge of the cup; they are of the length of the cup, and of an ovato-linear figure: the fruit is an ovato-acuminate capsule, semibifid, terminating in two reflex points, and containing two cells: the seeds are numerous and small.

**HEW-HOLE**, in ornithology, a name given to the wood-pecker, from its making holes in trees.

**HEXACHORD**, in antient music, a concord called by the moderns a sixth.

Guido divides his scale by hexachords, and there are seven contained in it, three by *B quadro*, two by *B natural*, and two *B molle*; and it is for this reason that he divided his scale into six columns, in which he disposed the hexachords. See the article **GAMUT**.

The hexachord is two-fold, greater and less. The greater hexachord is composed of two greater tones, and two less, and one greater semitone, which make five intervals. The less hexachord is of two greater tones, one lesser, and two greater semitones. See **TONE**, &c.

**HEXAEDRON**, or **HEXAHEDRON**. See the article **HEXAHEDRON**.

**HEXÆDROSTYLA**, in natural history, a genus of fossils consisting of crystalliform columnar spars, terminated at their summit by a pyramid, but adhering irregularly to some other body at their base. See the article **SPAR**.

There are three species of this genus of fossils. 1. The slender hexædrostylum, with a long pyramid, being so pure and clear a spar, and so much of the ordinary figure of the hexangular crystal, that there is no doubt but it has often been mistaken for crystal: its most frequent size is nearly two inches in length, and a third of an inch in thickness, the pyramid being about one fourth of that length. 2. The hexædrostylum, with a long irregular pyramid, being of a moderately equal, but somewhat coarse and impure texture, and subject to spots of various earths and minerals, and often so altered by them, as not to be known, but by its figure, which it ever keeps regularly to: it is naturally of a dusky white, but moderately transparent, considerably heavy, and very soft. 3. The hexædrostylum, with a very short pyramid, being usually of a very pure, clear, and

and fine texture, but sometimes so debased by earthy admixtures, that it becomes very coarse, and frequently spotted, flawed and blemished: it is of various sizes, but about an inch and a half is its most frequent length, and with that the usual proportion is about half an inch in thickness, and the pyramid seldom takes up more than one eighth of the length.

**HEXAGON**, in geometry, a figure of six sides and angles; and if these sides and angles be equal, it is called a regular hexagon.

The side of every regular hexagon, inscribed in a circle, is equal in length to the radius of that circle. Hence, it is easy, by laying off the radius six times upon the circumference, to inscribe an hexagon in a circle.

To describe a regular hexagon on a given right line A B (plate CXXIX. fig. 3.) draw an equilateral triangle A C B, and the vertex C will be the center of a circle which will circumscribe the hexagon required A B D E F G.

As 1 is to 1.672, so is the square of the side of any regular hexagon to the area thereof, nearly.

**HEXAGON**, in fortification, is a place defended by six bastions.

**HEXAHEDRON**, in geometry, one of the five platonic bodies, or regular solids; being the same with a cube. See CUBE.

**HEXAMETER**, *carmen hexametrum*, in antient poetry, a kind of verse consisting of six feet; the first four of which may be indifferently, either spondees or dactyls; the fifth is generally a dactyl, and the sixth always a spondee. Such is the following verse of Horace:

1 2 3 4 5 6  
Aut pro|desse vo|lunt, aut |dele|tare po|eta.

Or this one of Homer:

1 2 3 4 5 6  
Σκίπτρω|μὲν τοι|δῶκε τε|τίμα|σθαί περ|πάντων.

Sometimes indeed, a spondee constitutes the fifth foot; whence such hexameter verses are called spondaic; as in this of Virgil.

1 2 3 4 5  
Cara De|um sōbōles ma|gnum Jovis|incre-|

mentum.

Epic poems, as the Iliad, Æneid, &c. consist wholly of hexameter verses; whereas elegies and epistles consist usually of hexameter and pentameter verses, alternately.

Such hexameter verses please most, wherein dactyls and spondees follow each

other in an alternate order: and next to these, such as abound most with dactyls, as:

1 2 3 4 5  
Lulere | quæ vel|lem cala|mo per | misit a-|

6  
gressi

Adspicis | ut veni|ant ad |candida|testa co-|  
lumbæ.

**HEXANDRIA**, in botany, a class of plants, the sixth in order; comprehending all those plants which have hermaphrodite flowers, and six stamina in each. See FLOWER and STAMINA.

To this class belong the narcissus, garlic, daffodil, lilly, &c.

**HEXAPLA**, in church-history, a work published by Origin, containing a part of the Old Testament in the original hebrew, with several versions of it in six columns; from whence it was called hexapla, or the six-fold edition.

**HEXAPYRAMIDES**, in natural history, a genus of spars formed into pyramids, composed of six sides or planes, affixed to no column, but adhering to some solid body by the bases of their pyramids. See the article SPAR.

**HEXASTYLE**, in architecture, a building with six columns in front.

**HEXHAM**, a market town of Northumberland, sixteen miles west of Newcastle.

**HEYDON**, a borough town in Yorkshire, thirty-seven miles south-east of York, and six miles west of Hull. It sends two members to parliament.

**HEYLINGENSTAT**, a town of Germany in the circle of Upper Saxony; subject to the elector of Mentz: east long. 10°, north lat. 51° 27'.

**HEYLSHEM**, a town of the Austrian Netherlands, in the province of Brabant, situated five miles south of Tirlemont: east long. 4° 55', north lat. 50° 53'.

**HEYRS**, in husbandry, young timber-trees usually left for standards, in the felling of woods or copses.

**HEYTSBURY** a borough town of Wiltshire, fourteen miles north-west of Salisbury, sends two members to parliament.

**HLÆNA**, or HYÆNA, in zoology. See the article HYÆNA.

**HIATICULA**, the SEA-LARK, in ornithology, a species of charadrius, with a black front, and a white line on it. See the article CHARADRIUS.

It is a very pretty bird, about the size of the common lark, or a little larger. The upper

upper part of its body is grey, and the belly white.

**HIATUS**, properly signifies an opening, chasm, or gap; but it is particularly applied to those verses, where one word ends with a vowel, and the following word begins with one, and thereby occasion the mouth to be more opened, and the sound to be very harsh.

The term hiatus is also used in speaking of manuscripts, to denote their defects, or the parts that have been lost or effaced.

**HIBISCUS**, in botany, a genus of the monadelphia polyandria class of plants, the corolla whereof consists of five petals, vertically cordated, having one prominence of the apex greater than the other, and coalescing at the base: the fruit is roundish, and contains five cells: the seeds are kidney-shaped.

The several species of this plant are in english called the chinese-rose, the abelmosch, the bladder alcea, and the gum-leaved-ketmia.

The seeds of the abelmosch were once kept in our shops, as a provocative and cordial; but they are now out of use.

**HICUP**, or **HICCUGH**, in medicine, a spasmodic affection of the stomach and diaphragm, arising from any thing that irritates and vellicates their nervous coats. When it proceeds from a slight error in diet, it will soon end spontaneously, or by drinking any thing which dilutes the acrid matter; but it is sometimes of a more dangerous kind, and may proceed from a hurt of the stomach, poison, an inflammation of the stomach, intestines, diaphragm, bladder, or the rest of the viscera. Sometimes, immediately before death, it may proceed from gangrenes of the outward parts. In acute fevers, and chiefly the malignant, it is often fatal.

When it happens in old or weak people from a plentiful meal, especially from hard and flatulent aliment, or from drinking cold liquors, a draught of generous wine, or a dram of any spirituous liquor, will generally take it away. Stomachic powders mixed with peruvian bark, and taken in generous wine, are also profitable. When it proceeds from acid humours in the stomach, absorbent and alkaline medicines are good. If it proceeds from an acute fever, or an inflammation of the stomach, it is a dangerous disease: however, dulcified spirit of nitre, joined to an alexipharmic, and given often, is proper; or a dram of diascordium

given in the evening, may perform a cure. If it proceeds from a gangrene or mortification, it is generally incurable; but peruvian bark, with medicines against internal inflammations, are most likely to succeed. If it is caused by poison, plenty of milk must be taken with oil. Fuller declares, that he does not know a better medicine than the julep of musk; and Allen says, that this affords, one would almost think, supernatural assistance.

**HICKWALL**, or **WITWALL**, in ornithology, names used in several parts of the kingdom for the lesser black and white woodpecker, with the three lateral long feathers of the tail variegated at the top. It is a small bird, hardly weighing more than an ounce. See the articles **PICUS** and **WOODPECKER**.

**HIDAGE**, in law-books, an extraordinary tax antiently paid to the king for every hide of land. Sometimes, indeed, it is used for being quit of this tax.

**HIDE**, the skin of beasts, but particularly applied to those of large cattle, as bullocks, cows, horses, &c. See the article **SKIN**.

Hides are either raw or green, just as taken off the carcase; salted or seasoned with salt, alum, and salt-petre, to prevent their spoiling; or curried and tanned. See the article **CURRYING**, **TANNING**, &c.

Hides make a considerable article of commerce, being subject to the following duties and drawbacks, on importation, and when exported again. Buff-hides pay each 3 s. 9  $\frac{5}{100}$  d. and draw back 3 s. 6  $\frac{5}{100}$  d. and besides pay for every pound weight 7 d. and draw back

$4 \frac{66\frac{2}{3}}{100}$  d. Cow or horse-hides in the hair, pay each 7  $\frac{18\frac{1}{2}}{100}$  d. and draw back 6  $\frac{46\frac{7}{8}}{100}$  d.

ditto tanned, pay each 2 s. 4  $\frac{72\frac{1}{2}}{100}$  d. draw back 2 s. 1  $\frac{87\frac{1}{2}}{100}$  d. and for every pound weight 3  $\frac{5}{100}$  d. draw back 2  $\frac{33\frac{1}{3}}{100}$  d. Cow-

hides of Barbary and Muscovy pay each 7  $\frac{18\frac{1}{2}}{100}$  d. draw back 6  $\frac{46\frac{7}{8}}{100}$  d. And besides

if dressed in oil, for every pound weight 7 d. draw back 4  $\frac{66\frac{2}{3}}{100}$  d. if tanned, the

pound weight 3  $\frac{5}{100}$  d. draw back 2  $\frac{33\frac{1}{3}}{100}$  d. if tawed, the hide 3 s. 6 d. draw back 2 s.



2 s. 4 d. India hides pay each  $11 \frac{96\frac{2}{3}}{100}$  d.

draw back  $10 \frac{78\frac{2}{3}}{100}$  d. and besides if dressed

in oil, for every pound weight 7 d.

draw back  $4 \frac{66\frac{2}{3}}{100}$  d. if tanned, for each

pound  $3 \frac{50}{100}$  d. draw back  $2 \frac{33\frac{1}{3}}{100}$  d. if

tawed, for each hide 3 s. 6 d. draw back

2 s. 4 d. Hides of horses, mares and geld-

ings, pay for every 20 s. of their value

upon oath 4 s.  $9 \frac{4\frac{5}{6}}{100}$  d. draw back 4 s.

$3 \frac{7\frac{5}{6}}{100}$  d. and besides for every hide, 2 s.

draw back 1 s. 4 d. Losh-hides pay each

1 s.  $10 \frac{80}{100}$  d. draw back 1 s.  $9 \frac{33\frac{1}{3}}{100}$  d. and

besides for every pound weight, 7 d. draw

back  $4 \frac{66\frac{2}{3}}{100}$  d. Red or Mulcovy hides

tanned, coloured, or uncoloured, pay

each 1 s.  $7 \frac{1\frac{5}{6}}{100}$  d. draw back 1 s.  $5 \frac{2\frac{5}{6}}{100}$  d.

and besides for every pound weight, 3 d.

draw back 2 d. All other hides, and

pieces of hides, not above particularly

charged, pay for every 20 s. value upon

oath, 4 s.  $4 \frac{5}{6}$  d. draw back 4 s.  $3 \frac{7\frac{5}{6}}{100}$  d.

and if tanned, for every pound weight,

$3 \frac{50}{100}$  d. draw back  $2 \frac{33\frac{1}{3}}{100}$  d. if dressed in

oil, for each pound 7 d. draw back

$4 \frac{66\frac{2}{3}}{100}$  d. and if tawed, each hide pays

3 s. 6 d. and draws back 2 s. 4 d.

For the duty on british hides, tanned,

&c. See the articles EXCISE, LEATHER,

PARCHMENT, &c.

Hides and calves-skins, tanned in Great

Britain, draw back, upon due exportation,

two third parts of the duties originally

paid for them; and besides a farther

allowance of one penny for every

pound weight of skin so dressed, there is

a draw-back of  $1\frac{1}{2}$  d. for every pound

weight manufactured into boots, shoes,

gloves, &c.

**HIDE of land**, was such a quantity of land as might be plowed with one plough within the compass of a year, or so much as would maintain a family; some call it sixty, some eighty, and some an hundred acres.

The distribution of this kingdom by hides of land is very antient, mention being made of it in the laws of king Ina. Henry I. had three shillings for every hide of land, in order to raise a

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dowry for his daughter: this tax was called hidage.

**HIDE-BOUND**, among farriers, a distemper in horses when the skin sticks so fast to the back and ribs, that the hand cannot separate the one from the other without great difficulty: his body is at the same time lean, his back-bones stand up, his guts are for the most part deficient in moisture, and his dung dry and more offensive than common.

If a horse become hide-bound by hard riding and ill keeping, he may be cured by good keeping. If it be the effect of a fever, or some other disease, if that be cured which is the cause, the effect will cease: but if he has no fever upon him, and he is hide-bound only from lowness of blood and spirits, give him boiled barley, white-water, or the like, and when his flesh is raised, harden it with good oats, beans, and moderate exercise.

**HIDEL**, in old law-books, denotes a sanctuary or place of protection.

**HIDROTICS**, in medicine, the same with sudorifics. See SUDORIFIC.

**HIERACIUM**, HAWKWEEED, in botany, a genus of the syngenesia-polygamia-æqualis class of plants, the compound flower of which is imbricated and uniform, consisting of a great number of equal, hermaphrodite corollulæ, which are linear, truncated, and quinquecostate: the stamina are five very short capillary filaments: the seeds are solitary, obtusely quadrangular, and winged with down. See plate CXXXI. fig. 3.

The leaves of this plant are esteemed cooling, and good in inflammations. They likewise strengthen the sight.

**HIERACITES**, *hieracite*, in church-history, christian heretics in the third century, so called from their leader Hierax, a philosopher of Egypt; who taught that Melchisedec was the holy ghost, denied the resurrection, and condemned marriage: he likewise held, that no one could be saved who died before he arrived at years of discretion. The disciples of Hierax taught that the word, or son of God, was contained in the father, as a little vessel is contained in a great one; from whence they had the name metagimionists, from the greek word *μεταγμιον*, which signifies contained in a vessel.

**HIERA PICRA**, in pharmacy, a powder prepared in the following manner: take

9 X

of

of the gum extracted from socotrine aloes, one pound; of winter's bark, so called, three ounces; powder them separately, and then mix them.

*Species of HIERA PICRA*, according to Quincy, is made thus: take of cinnamon, zedoary, asarum, the lesser cardamom seeds, and saffron, of each six drams; cochineal, a scruple; of the best aloes, twelve ounces; and let them all be made into a powder together.

*Simple HIERA PICRA*, is made by mixing the spices of hiera picra with despumated honey, or syrup of violets, into an electuary.

*Tincture of HIERA PICRA*, is made thus: take of the species of hiera picra, one ounce; of white-wine, one pound; digest and then strain off the fine liquor. It may be made in the same manner with a french spirit.

This may be so managed as to become a good alterant. It is generally given over night from two to three ounces; and sometimes only one spoonful at night, and it produces excellent effects in a cachexy, chlorosis, and obstructions of the menses.

**HIERARCHY**, among divines, denotes the subordination of angels. See the article **ANGEL**.

Some of the rabbins reckon four, others ten, orders or ranks of angels; and give them different names, according to their different degrees of power and knowledge. Dionysius the areopagite, the jesuit Celert, and many others, have gone so far as to settle a kind of ceremonial or rule for the precedence of angels, as seraphim, cherubim, thrones, dominions, principalities, &c.

**HIERARCHY** likewise denotes the subordination of the clergy, ecclesiastical polity, or the constitution and government of the christian church, considered as a society. The nature of this polity will be best understood, by looking back to the constitution of the antient christian church; which, as a society, consisted of several orders of men, *viz.* ἡγούμενοι, πρεσβυτεροι, and κατηχημενοι; that is, rulers, believers, and catechumens.

Under the rulers are comprehended the whole body of the clergy, *viz.* bishops, priests, and deacons. See the articles **BISHOP**, **PRIEST**, &c.

The believers were perfect christians, and the catechumens imperfect. See the articles **CHRISTIANS** and **CATECHUMEN**. It has been pretended, says Broughton,

that the bishops and presbyters were the same, which opinion has given rise to the presbyterians. See **PRESBYTERIANS**.

The bishops, presbyters, and deacons, therefore, according to him, constituted the three superior orders of the clergy; besides whom there were several inferior orders, as subdeacons, acoluthists, exorcists, readers, door-keepers, singers, catechists, stewards, &c. See the article **ACOLUTHI**, &c.

All these orders of the clergy, continues the same author, were appointed to their several offices in the church, by solemn forms of consecration or ordination, and had their respective privileges, immunities, and revenues: and by means of this gradation and subordination in the hierarchy, the worship and discipline of the primitive church were kept up.

How far the constitution of our own churches agrees with or has departed from the plan of the antient hierarchy, may be seen at one glance of the eye. We have the first general distinction of bishops, presbyters or priests, and deacons. Among the first, we retain only the distinction of archbishops, with the title likewise of primates and bishops; having no patriarchs or chorepiscopi: but as to the inferior orders of the clergy, as acoluthists, &c. they are all unknown to the church of England.

The unity and order of the christian church were secured by laws both ecclesiastical and civil. The ecclesiastical laws were, either rules and orders made by each bishop for the better regulation of his particular diocese; or laws made in provincial synods, for the government of all the dioceses of a province; or, lastly, laws respecting the whole christian church made in general councils. See **SYNOD**. The civil laws of the church, were the edicts made from time to time by the emperors, either restraining the power of the church, granting it new privileges, or confirming the old; and the breach of these laws were severely punished both by the church and state.

**HIERES**, a town of Provence, in France, situated on the Mediterranean, eight miles east of Toulon: east long. 6° 5', north lat. 43° 5'.

**HIERES** is also the name of several islands situated in the Mediterranean, near the coast of France, opposite to the towns of Hieres and Toulon.

**HIEROGLYPHICS**, in antiquity, mystical characters, or symbols, in use among the

the Egyptians, and that as well in their writings as inscriptions; being the figures of various animals, the parts of human bodies, and mechanical instruments.

But besides the hieroglyphics in common use among the people, the priests had certain mystical characters, in which they wrapped up and concealed their doctrines from the vulgar. It is said, that these something resembled the chinese characters, and that they were the invention of Hermes. Sir John Marsham conjectures, that the use of these hieroglyphical figures of animals, introduced the strange worship paid them by that nation: for as these figures were made choice of, according to the respective qualities of each animal, to express the qualities and dignity of the persons represented by them, who were generally their gods, princes and great men, and being placed in their temples, as the images of their deities; hence they came to pay a superstitious veneration to the animals themselves.

The meaning of a few of these hieroglyphics, has been preserved by antient writers. Thus we are told they represented the supreme deity by a serpent with the head of a hawk. The hawk itself was the hieroglyphic of Osiris; the river-horse, of Typhon; the dog, of Mercury; the cat, of the moon, or Diana; the beetle, of a courageous warrior; a new-born child, of the rising sun; and the like.

**HIEROGRAMMATISTS**, *ἱερογραμματισταί*, *i. e.* holy registers, were an order of priests among the antient Egyptians, who presided over learning and religion.

They had the care of the hieroglyphics, and were the expositors of religious doctrines and opinions. They were looked upon as a kind of prophets, and it is pretended that one of them predicted to an egyptian king, that an Israelite, (meaning Moses) eminent for his qualifications and achievements, would lessen and depress the egyptian monarchy. They were thought to be skilled in amulets and charms, in astrology and augury: by this means they had a great sway in the egyptian senate or council, and were always at court to assist the king with their advice. They were exempted from the public taxes, were esteemed of the highest quality, and bore a scepter like the king's: but after the conquest of Egypt by the Romans, they became very inconside-

rable, and dwindled into mere fortune-tellers. They wore a linen-coat, and paper-shoes; they bathed thrice a day and twice in the night in cold water, and in their religious worship used to beat and discipline themselves very severely.

**HIEROMANCY**, *ἱερομαντεία*, in antiquity, that part of divination which predicted future events from observing the various things offered in sacrifice. See **DIVINATION** and **SACRIFICE**.

**HIEROMENIA**, in antient chronology, a corinthian month, commonly called panemos; being the same with the athenian boedromion.

**HIEROMNEMON**, the name of an officer in the greek church, whose principal function it was to stand behind the patriarch at the sacraments, and other ceremonies of the church, and to shew him the prayers, psalms, &c. in the order in which they were to be rehearsed. He likewise assisted the patriarch in putting on his pontifical vestments; and assigned their places to those who sat round him, when seated on his throne. This office, in this latter respect, was the same as that of master of the ceremonies to the pope. The hieromnemon was commonly a deacon.

**HIEROPHANTES**, in grecian antiquity, the name by which the Athenians called those priests and priestesses who were appointed by the state to have the supervial of things sacred, and to take care of the sacrifices.

They were obliged to the strictest continency, in regard to the dignity of their ministry; for which reason they drank decoctions of hemlock, to extinguish carnal desires.

The ceremonies of initiation, into the mysterious rites of Ceres, was performed by the hierophantes; whose names were held in such veneration, that the initiated were expressly forbidden to mention them in the presence of the profane.

**HIEROPHYLAX**, an officer in the greek church, who was guardian or keeper of the holy utensils, vestments, &c. answering to our sacrista or vestry-keeper.

**HIEROSCOPY**, the same with hieromancy. See **HIEROMANCY**.

**HIGH**, *altus*, a term of relation, importing one thing's being superior or above another: thus we say, a high mountain, the high court of parliament, high relief, &c. See the articles **MOUNTAIN**, **PARLIAMENT**, &c.

**HIGH**, in music, is sometimes used in the same sense with loud, and sometimes in the same sense with acute.

**HIGH bearing cock**, a term used in speaking of fighting cocks, for one that is larger than the cock he fights with.

**HIGH-WATER**, the state of the tide when highest, or the time just before it begins to ebb. See the article **TIDES**.

**HIGH-WAY**, a free passage for the king's subjects, on which account it is called the king's high-way, tho' the freehold of the soil belong to the lord of the manor, or the owner of the land. Those ways that lead from one town to another, and such as are drift or cartways, and are for all travellers in great roads, or that communicate with them, are high-ways only; and as to their reparation, are under the care of surveyors.

By the 2 & 3 Phil. & Mar. c. 8. it is enacted, that constables and churchwardens of parishes, calling the parishioners together, shall yearly elect two honest persons to be surveyors of the high-ways, who are thereby authorized to order and direct the persons and carriages employed in amending them: and the persons so chosen, are to take upon them the execution of the office, on pain of forfeiting 20 s. The same statute has farther ordained, that certain days shall be appointed for working on the repairs of high-ways, on which every person having a plough-land, or keeping a draught or plough, is to send out one cart, provided with horses, tools, &c. and two able men attending; also clergymen, keeping a coach and horses, shall be obliged to send out a team, or shall forfeit 10 s. for every default therein: and every householder or cottager shall work on the said days, for the amendment of the high-ways, under the penalty of 1 s. 6 d. a day, leviable by distress, &c. Where a high-way lies within a parish, the parish is bound to repair it, unless it appears that the same ought to be repaired by some person, either by reason of tenure or prescription. On oath made, by the surveyors, of sums expended in repairing any high-way, justices of the peace may order them a rate not exceeding 6 d. in the pound; but money thus raised, shall not excuse working on the high-ways, where the statute-work and labour has not been performed. 3 & 4. Wil. & Mar. If a high-way leading through a field is out of repair, travellers may justify going out of the track, tho' there

be torn down; and in case a high-way is not sufficient, any passenger may break down the inclosure, and go over the land adjoining, till a sufficient way be made. All manner of injuries to high-ways that render them less commodious to travellers, are deemed nuisances; such as laying logs of timber in them, erecting gates, or making hedges across them, permitting boughs of trees to hang over them, &c. Persons neglecting to scour their ditches, whereby the ways are dangerous, after thirty days notice given by the surveyors, are liable to the forfeiture of 2 s. 6 d. for every eight yards not scoured; and not under 20 s. or exceeding 5 l. if they permit soil to lie in the high ways. Geo. I. c. 52. Posts with inscriptions ought to be set up by surveyors, where two or more cross roads meet, as a direction to travellers to the next market-towns, on the penalty of 10 s. 8 & 9 Wil. III. 7 Geo. II. c. 9.

**HIGH-WAY-MEN**, are robbers on the high-way, for the apprehending and taking of whom a reward of 40 l. is given by the statute of 4 & 5 Wil. & Mar.

**HIGHAM-FERRERS**, a borough town of Northamptonshire, twelve miles north-east of Northampton: it sends two members to parliament.

**HIGHNESS**, a title given to princes. Before king James I. the kings of England had no other title but that of highness; which was also the case of the kings of Spain before Charles V.

At present all the sons of crowned heads are stiled royal highness, as the electors of Germany are electoral highness.

**HIGHWORTH**, or **HIGWORTH**, a market town of Wiltshire, situated thirty miles north of Salisbury.

**HIIS TESTIBUS**, a phrase antiently added in the end of a deed, written in the same hand with the deed; upon which the witnesses were called, the deed read, and their names entered. See the article **WITNESS**.

*Hiis testibus* in subject deeds, continued till, and in, the reign of Henry VIII.

**HILARIA**, an antient roman festival, observed on the eighth of the calends of April, or the twenty-fifth day of March, in honour of the goddess Cybele. It was so called from the various expressions of joy and mirth on this occasion. The statue of the goddess was carried in procession through the streets of the city. The day was spent in masquerades of all sorts, and every one was permitted to appear

appear in what disguise he pleased. The day before the festival was spent in tears and mourning; the reason of which was probably this: Cybele represented the earth which, at that time of the year, begins to feel the kindly warmth of the spring, and to pass from winter to summer; so that this sudden transmutation from sorrow to joy, was an emblem of the vicissitude of the seasons, which succeeded one another.

**HILARODI**, in the ancient music and poetry, a sort of poets among the Greeks, who went about singing little gay poems or songs, somewhat graver than the ionic pieces, accompanied with some instrument. From the streets they were at length introduced into the tragedy, as the *magodi* were into comedy. They appeared dressed in white, and were crowned with gold. At first they wore shoes, but afterwards they assumed the *crepida*; being only a sole tied over with a strap.

**HILARODIA**, a poem or composition in verse, made or sung by a sort of rhapsodists called *hilarodi*. See the preceding article.

**HILARO-TRAGEDIA**, a dramatic performance, partly tragic, and partly comic. Scaliger holds the *hilaro-tragedia*, and the *hilarodia*, or poem sung by the *hilarodi*, to be the same thing. Others rather take the *hilaro-tragedia* to have been pretty nearly what we call a *tragicomedy*. Others again will have it to have been a pure tragedy, only terminating with a happy catastrophe, which brings the hero out of the wretched into the fortunate state. Suidas mentions one *Rhinton*, a comic poet of Tarentum, as the inventor of this kind of poetry.

**HILARY-TERM**, among lawyers. See the article **TERM**.

**HILDESHEIM**, the capital of a bishopric, surrounded by the territories of Brunswic, and subject to its own bishop: east long. 10°, north lat. 52° 17'.

**HILL**, in the natural history of the earth. See the article **MOUNTAIN**.

**HILUM**, among botanists, denotes the eye of a bean. See **BEAN** and **EYE**.

**HIN**, a hebrew measure of capacity for things liquid, containing the sixth part of an epha, or one gallon two pints, or 2.533 solid inches, english measure.

**HIND**, a female stag in the third year of its age.

**HIND-CALF**, a male-hart or hind in the first year. She fawns in April or May. See the article **HUNTING**.

**HIND**, or **HINE**. See the article **HINE**.

**HIND HAND**, in the manege. See the article **HAND**.

**HINDENI HOMINES**, signifies a society or class of men.

In the time of our Saxon ancestors, all men were ranked into three classes, and rated agreeably to the classes they were in; and if any one committed an injury, he was to make reparation according to the value of the person to whom it was done. The lowest were those worth 200 shillings, who were called *viriducenti*, or *twybindemen*, and their wives *twybindas*. The middle were valued at 600 shillings, and were termed *sixbindemen*, and their wives *sixbindas*: and the highest were valued at 1200 shillings, and were stiled *twelfbindemen*, and their wives *twelfbindas*.

**HINDON**, a borough town of Wiltshire, situated fourteen miles west of Salisbury: it sends two members to parliament.

**HINDOWN**, or **HENDOWN**, the capital of the country of the Hindowns, in the hither India: east long. 76° 30', north lat. 27°.

**HINE**, or **HIND**, a husbandman's servant. Thus the person who oversees the rest, is called the master hine.

**HINGES**, the joints on which gates, doors, lids, folds of tables, &c. hang and turn in opening, shutting, or folding. They are of different denominations, as butts, used by the joiners for hanging table-leaves, &c. (See plate CXXXII. fig. 1. n° 1.) Casement, for hanging casements upon (*ibid.* n° 2.) dove-tails, (n° 3.) and eses (n° 4.) for light doors and lockers; garnet cross, for hanging large doors or heavy scuttles in ships (n° 5.); port, for hanging ships ports (n° 6.); scuttle, particularly used for scuttles (n° 7.)

Thus these there are many others of different forms and uses, distinguished by different names, as casting, chest-black Lancashire, smooth-field coach, desk, dozen ware long, dozen ware short, weighty long, weighty short, lambs-heads, port side Lancashire, side smooth-field, side with squares, side with rising joints, Lancashire and smooth-field stalls; beds, box, trunk of several kinds; screw, shutter, Lancashire joints, and Lancashire dozen-ware with books.

Hinges of all kinds are prohibited to be imported.

**HINGHAM**, a market-town, ten miles south-west of Norwich.

**HINK**.

**HINKLEY**, a market-town, ten miles south of Leicester.

**HIP**, or **HAW**, in the materia medica, is reputed attenuant and diuretic. There is a very pleasant conserve of hips kept in the shops.

**HIP**, or **HAUNCH**, among farriers. See the article **HAUNCH**.

**HIP-SHOT**, is said of a horse that has sprained his haunches. See **STRAIN**.

**HIPS** in building, those pieces of timber placed at the corner of a roof.

The hips are much longer than the rafters, by reason of their oblique position, and are planted not with a right or square angle, but a very oblique one, and consequently are not, or at least ought not, to be square at any angle, (as rafters are not at all) but level at every one of them; and, which is more, as rafters have but four planes, these commonly have five. They are generally by country workmen called corners; and some call them principal rafters, and others sleepers. The truth is, hips and sleepers are much the same, only sleepers lie in the vallies, (and join at the top with the hips) but those surfaces or planes which make the back of the hip, are under the sides of the sleeper.

The backs of a hip are those two superficieses or planes on the outside of the hip, which lie parallel, both in respect of the length and breadth, with the superficieses of the adjoining side and end of the roof.

**HIP-GOUT**, *sciatica*. See the articles **GOUT** and **SCIATICA**.

**HIP-MOULD**, is by some used for the back of the hip, but others understand it to mean the prototype or pattern, commonly made of a thin piece of waincoat, by which the back and sides of the hip are set out.

**HIP-ROOF**, among carpenters, called also italian roof, is a roof which has neither gable-head, spread-head, nor jerken-head (by which is meant such heads as are both gable and hip at the same end;) for it is a gable or upright as high as the collar-beam, and then there are two short hips, which shut up with their tops to the tops of a pair of rafters, which country carpenters call singlars. A hip-roof has rafters as long, and with the angles of the foot, &c. at the ends of buildings, as it has at the sides; and the feet of the rafters at the ends of such buildings as have hip-roofs, stand on the

same plane, *viz.* parallel with the horizon, and at the same height from the foundation, with rafters on the sides of the roof.

**HIPPARCHUS's PERIOD**. See **PERIOD**.

**HIPPEUS**, in physiology, a kind of comet, so called from its resemblance to a horse. But the shape of this comet is not always alike, being sometimes oval, and sometimes imitating a rhomboides. Its train also is sometimes spread from the front, or fore part, and sometimes from the hind part.

Hence this class of comets is distinguished into equinus barbatus, equinus quadrangularis, and equinus ellipticus. See the article **COMET**.

**HIPPO**, in zoology, a species of serpent, with 160 scuta on the abdomen, and 100 squamæ on the tail. See **COLUBER** and **SERPENT**.

**HIPPOBOSCA** and **HIPPOBOSCUS**, in zoology, names given to the horse-fly, frequent about the bodies of horses, to whom it is very troublesome.

**HIPPOCAMPUS**, the **SEA HORSE**, in ichthyology, the square-bodied syngnathus, with no fin at the tail. It is five inches long, and where thickest, about an inch in diameter; the head is long, slender, and compressed, forming a kind of snout; the body is of a quadrangular figure, but the divisions are not equal, and in the thickest part it is hexangular or heptangular. See **SYNGNATHUS**.

It is a very singular and rare fish; the tail of which usually curls up in the drying, and its head being bent down, gives it a rude resemblance to a horse; whence the name. See plate **CXXXII. fig. 3.**

**HIPPOCASTANUM**, **HORSE-CHESNUT**, the same with the *esula* of Linnæus. See the article **ESULA**.

**HIPPOCENTAUR**, in antiquity, a fabulous animal, half man half horse.

What gave rise to the fable of hippocentaurs, was this. The Thessalians are said to have been the first inventors of the art of breaking horses; and being first seen on horseback, they seemed to make but one body with the horses; whence the origin of the fable.

**HIPPOCRAS**, an infusion of aromatic powders in wine, which is afterwards edulcorated with sugar and honey; being so called because that, when the infusion is finished, it is strained through Hippocrates's sieve.

It is prepared of various aromatics and other

Fig. 1. HINGES.

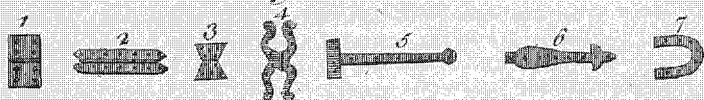


Fig. 2. HIPPOPOTAMUS.

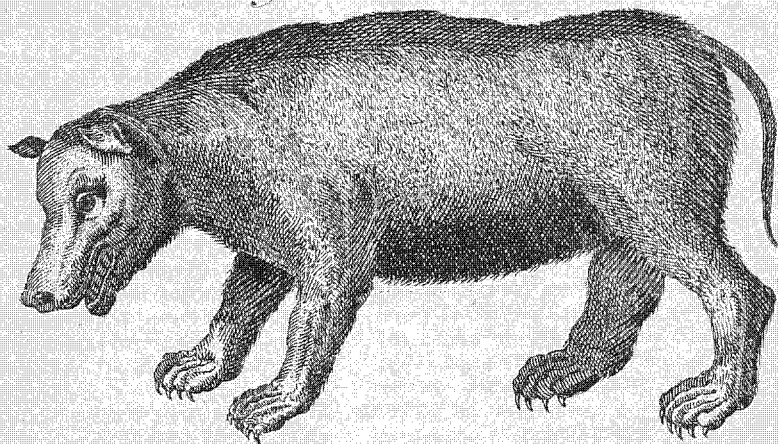


Fig. 3. HIPPOCAMPUS.

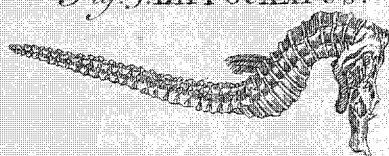
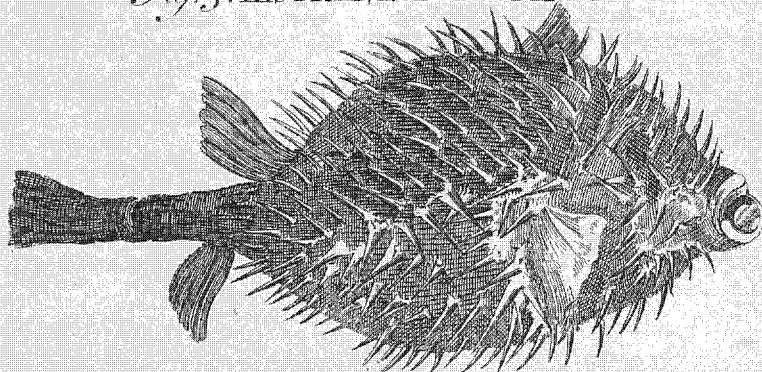


Fig. 4. HIRUDO, the LEECH.



Fig. 5. HIS TRIX, the PORCUPINE FISH.







other ingredients, according to the different intentions to be answered.

**HIPPOCRATEA**, in botany, a genus of plants, whose characters are not justly ascertained: the calyx is a perianthium formed of a single leaf, patent, and lightly divided into five obtuse segments, larger than the corolla; the corolla is monopetalous, oval, truncated at the top, and undivided at the edges: the fruit is a capsule of a depresso-plane figure, patent, semitrifid, with trifid segments; and contains three cells, each of them bivalve, and the valves carinato-compressed: the seeds are oblong, and have a membranaceous ala.

**HIPPOCRATES'S SLEEVE**, a bag used to strain syrups and decoctions for clarification. See **CLARIFICATION**.

**HIPPOCREPIS**, COMMON HORSESHOE VETCH, in botany, a genus of the diadelphia-decandria class of plants: the corolla is papilionaceous; the vexillum cordated, seated in the unguis the length of the cup; the carina is lunulated and compressed: the fruit is a compressed plane pod, very long and reflex, and jointed: the seed is single in each joint, of an oblong and incurved figure.

**HIPPODROME**, in antiquity, the course where horse-races were performed.

**HIPPODROMUS**, in grecian antiquity, the boeotian name for the athenian month hecatombæon. See **HECATOMBÆON**.

**HIPPOGLOSSUS**, the TURBOT, in ichthyology, a species of pleuronectes, with the eyes on the right side, and the body smooth.

It grows to a considerable size, and is one of the most esteemed fish at our tables. The dorsal-fin reaches from the head to the tail, and has an hundred and five rays; the pectoral fins have each sixteen rays, and the ventral ones six. See the article **PLEURONECTES**.

**HIPPOMANE**, in botany, a genus of plants whose characters are not properly ascertained; the male and female flowers are produced distinct; the male flower has no corolla: the fruit is a large, globose berry, somewhat umbilicated, and containing only one cell: the seed is round and woody. The eating of this plant is said to make horses mad, whence its name *ἵππομανές*.

**HIPPOMANES** signifies the expressed juice of the tithymallus; as also a juice distilling from the genitals of a mare, in the time of her covering: some again take it for the secundines of a mare; and,

lastly, it signifies a fleshy substance adhering to the forehead of a colt newly foaled, which some imagine to have a virtue of procuring love, and promoting the birth.

**HIPPOMYRMEX**, the HORSE-ANT, in zoology, a species of ant, much larger than the common ant. See **ANT**.

**HIPPOPHAE**, the SWALLOW-THORN, or SEA BUCK-THORN, in botany, a genus of the dioecia-tetrandria class of plants, having no corolla; the calyx of the male flowers is divided into two parts, as is also the calyx of the female: the fruit is a globose, unilocular berry; the seed is single and roundish.

Hippocrates prescribes the juice of this plant to evacuate white phlegm; and also as a cathartic in other disorders.

**HIPPOPOTAMUS**, the RIVER-HORSE, a genus of quadrupeds, of the order of the jumenta, the characters of which are these: the fore teeth of the upper jaw are four, and placed in pairs; those of the lower jaw are prominent, and the intermediate ones are protended forward; the canine-teeth are single, and obliquely truncated; the teats are only two, and placed near the groin.

The hippopotamus is a native of Africa, passing a great part of its time under water, in the rivers of the Nile and Niger; but comes on shore to sleep and breed. It is a large unweildy animal, as big as an ox. See plate CXXXII. fig. 2.

**HIPPURIS**, in botany, a genus of the monandria-monogynia class of plants, having no corolla: the cup is scarce distinguishable; it consists of only two extremely small margins, standing opposite to one another on the head of the germen: there is no pericarpium; but after every flower there comes a seed, which is roundish and naked.

**HIPPURUS**, in ichthyology, the dolphin or coryphæa with a forked tail. See the articles **DOLPHIN** and **CORYPHÆA**.

**HIRCANIA**, in geography, the provinces of Persia in Asia, which lie on the southern shore of the Caspian sea.

**HIRCHFELD**, a city of Germany, in the circle of the upper Rhine, and langravate of Hesse Cassel, situated on the river Fulda, in east long. 9° 32', north lat. 50° 47'.

**HIRCI**, or **SANGUIS HIRCI**. See the article **SANGUIS**.

**HIRCUS**, in anatomy, a part of the auricle or outer ear, being that eminence next the temple. See **EAR**.

**HIRCUS**, a GOAT, in astronomy, a star of the

the first magnitude, the same with capella.  
See the article **CAPELLA**.

**HIRCUS** is also a name used by some writers for a comet encompassed, as it were, with a mane, seemingly rough and hairy.

**HIRCUS**, a denomination given to the rank smell exhaling from the armpits.

**HIRSBURG**, a town of Silesia, in the territory of Jawer, forty-four miles south-west of Breslaw, in east long. 15° 50', north lat. 50° 50'.

**HIRTELLA**, in botany, a genus of the triandria-monogynia class of plants, the corolla whereof consists of five equal petals: these are roundish and hollow, smaller than the cup, and deciduous: the fruit is an oval berry, broadest at the top, a little compressed, and obscurely trigonal: the seed is single, and of the figure of the cup.

**HIRUDO**, the **LEECH**, in zoology, a well known naked insect, with a flattened but not jointed body, and broader at the end than elsewhere, and the skin soft and glossy.

The common leech grows to two or three inches in length, and is of a blackish colour, variegated with yellow. See plate **CXXXII.** fig. 4.

The horse-leech is larger than the former species, black on the back, and lead-coloured on the belly. The snail-leech, is only about an inch in length, and of a whitish colour; and the great-tailed leech grows to an inch and an half in length, and is of a dusky-brown colour. See the article **LEECH**.

**HIRUNDO**, in ornithology, a genus of birds, of the order of the passerines; comprehending the common house-swallow, the field swallow, the martin, and the goat sucker.

The characters of the genus are these: the beak is very small, of a subulated figure, crooked, and depressed at the base; and the opening of the mouth is enormously wide.

The common swallow is about the size of the linnet: the upper part of the body is of a glossy bluish-black, the tail-feathers are spotted with white, and the breast and belly are of a snow-white.

**HIRUNDO**, the **SWALLOW-FISH** or **TUB-FISH**, in ichthyology, a species of trigla, with a somewhat prickly head, and with a remarkable pinnule at the pectoral fins: which are so long, as to be of use in flying, or raising itself above the water. Hence, by some inaccurate writers, it has been confounded with the exocoetus, or flying-

fish, properly so called. See the article **EXOCOETUS**.

**HISPANIOLA**, an island of America, in the Atlantic ocean, situated between 67° and 74° of west long. and between 18° and 20° north lat. being about 420 miles long from east to west, and 120 in breadth. It is frequently called St. Domingo, from the capital thereof.

**HISPID LEAF**, among botanists, on whose surface is covered with more thick and rigid hairs than the pilose leaves are.

**HISPID STALK**, among botanists, a stalk roughly hairy.

**HISSING LETTERS**, among grammarians, are S, X, and Z, so called on account of their harsh sound.

**HISTORICAL**, something that relates to history: thus we say, historical truth, historical style, historical narration of facts, &c. See the article **HISTORY**.

**HISTORIOGRAPHER**, a professed historian, or writer of history.

An historian of all authors spreads the most ample theatre; he erects the greatest tribunal on earth; for it is his office to sit supreme judge of all that passes in the world, to pronounce the destiny of the great ones of the earth, and fix their character with posterity; to do justice to virtue and worth, in bestowing eternity upon great and good actions, and fixing an everlasting mark of infamy on bad ones; to instruct all people and nations, and direct the conduct of ages; he therefore ought to be endowed with many great and uncommon qualifications. He must be a person of consummate knowledge of men and things, of sound judgment, uncommon sagacity and penetration, experienced in matters of state and war, of great integrity, firmness of mind, freedom of sentiment, and master of a pure, clear, nervous, and exalted style. An historian whose province it is to speak to kings and princes, to the great men of all ages and countries, and to be the common master and instructor of mankind, must not only write with purity, simplicity, and manly sense, but with dignity and elegance: he must reject all that is vulgar and low in style, make the majesty and sublimity of his expression comport with the dignity of his subject; must by an exact choice and propriety of words, a natural disposition of phrases, and a prudent moderate use of figures, give weight to his thoughts, force to his language, and imprint a character of greatness on all that he says. He must

at the same time represent things with an air of gravity and prudence, and not give a loose to the heat of imagination, or vivacity of wit; but discreetly suppress every thing that shall seem idle, languid, and unprofitable, and give every thing that just figure and proportion which is consistent with propriety and decorum. He must endeavour at a noble simplicity of thought, language, design, and ordinance, and carefully avoid all profuseness of false conceit, strained expression, and affected pompousness so inconsistent with the gravity, dignity, and noble character of history. In a word, he must write so as to be intelligible to the ignorant, and yet charm the wise; form and express such ideas as are great, and yet shall appear very common, and intermix no other ornament with his narration than what the modesty of truth can bear. He should be above the reach and power of hopes and fears, and all kinds of interest, that he may always dare to speak the truth, and write of all without prejudice; religiously observing never to abuse the public faith, nor to advance any thing upon common fame, which is always uncertain, but upon undoubted memoirs and faithful relations of such persons as have had a hand in affairs. He must always be upon his guard against the bias and affections of those who supply him with matter, and must not credulously give his assent to the historians that went before him, without enquiring narrowly into their character, and what influence they may have been under when they wrote, in order to make a just estimate of their weight and credit.

An historian, as to his matter, should choose subjects great in themselves, and such as are worthy of public fame and remembrance; and should make himself so far master of his matter, as to be able to cast it into what form he pleases, and to strike upon all his subjects the colours they are naturally disposed to bear, in order to make his lessons profitable to posterity, by regulating the heart and spirits of men, animating them to great and virtuous actions by illustrious examples, and cautioning them against vice, folly, cruelty, and injustice, by laying open the fatal consequences resulting from them. The course of his narration must proceed in the order of time in which the facts happened, in a pure, grave, uninterrupted series, such as may not improperly be compared to a great

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river flowing with composed majesty and stately smoothness; and when it falls in his way to introduce little occurrences, they must be so artfully interwoven with the great, in the thread of the narration, as to offer a seasonable entertainment and relief to the reader from the fatigue that too sedulous an attention to the great, requireth. He must also observe great judgment in the ordinance and disposition of events and their circumstances, so as to interest the reader, and let him into all his thoughts and views, by making his persons act as their character and temper inclined them; discovering their manners, sentiments, designs, motives, and operations as they really stand in a necessary dependence upon each other, and with so natural a connection, as to show nothing out of its place. His transitions, in which consists the great art of narration, and one of its principal beauties, must be natural and easy, arising from the difference of subject rather than expression. He must make a wise and judicious choice of circumstances, such as are proper to enlarge and improve the ideas of things, and to strike that light and colour upon them which most easily attracts belief and engages the mind; and must for that purpose always observe a due mixture of great and little circumstances, neither of which must be carried beyond nature, or be so minute, low, or frivolous, as to debase his subject. He must not only recite the bare events and actions of men, but also lay open the motives and principles from which they took their rise, and upon which they proceeded to their final issues. He must lay open the hearts of the actors, let his reader into the most important secrets of their councils and designs, and oblige him with a sight of those secret springs, which moved them to enterprizes, and of the causes of their success or miscarriage. He must be very sparing and cautious in the use of descriptions, which are to be introduced so far only as they serve to illustrate things that are essential to the main subject, and to enliven the narration: and even in that case, they must be succinct and elegant. The frequent use of harangues is disapproved of by many judicious persons; for these long formal harangues of generals to their soldiers, when in the presence of the enemy, and ready to enter upon action, which we find in many historians, are undoubtedly not only unnatural and

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impro-

improbable, but contrary to the truth of history. Nevertheless, a short speech suited to the subject, made by a person of eminent character has its proper beauty and animates a narration. A judicious historian ought not to admit any portraits into his work but those of the greatest persons, and such as are principally interested, and have the chief hand in affairs; and these must be real, natural and truly resembling their originals; expressive of their genius, the qualities of the head and heart, rather than descriptive of the external form of his personages. When such are finished with a masterly hand, with true judgment and success, they are not only great ornaments and embellishments in history, but of use to strip the hearts of men of their disguises, to lay open all their secret folds, and disclose the real springs of actions. It is a great fault in an historiographer to abound too much in reflections of his own; he therefore must not turn philosopher or moralist indifferently upon all occasions; for every man desires to be free in his judgment of the facts represented to him, and the consequences he is to draw from them, in which consists the greatest pleasure of the reader. But if an author should throw in, or mingle reflections of his own with his story, they must be such as arise naturally from the subject, and contain a great and noble sense in a few words; they must not be too fine spun or studied, nor have more brightness than solidity, but appear rather to be the reasoning of a wise statesman, than the affectation of a declaimer; nor must they be too frequent, or too loose and disjointed, but be enamelled in the body of the work. Digressions, if made with judgment, and not too wide and foreign from the subject, have also their proper grace and ornament in history; as they give an agreeable variety to the narration, and relieve the mind of the reader; but they must be introduced by the historian with an artful hand and great address; they must bear an alliance and connection with the purport of the history, and their length must be proportionably greater or less, as they are more nearly or remotely allied to the capital point of the story.

**HISTORY**, a description or recital of things as they are, or have been, in a continued, orderly narration of the principal facts and circumstances thereof.

History, with regard to its subject, is divided into the history of nature, and the history of actions. The history of nature (which is much the same with physiology) is a description of natural bodies, whether terrestrial, as animals, vegetables, fossils, fire, water, air, meteors, &c. or celestial, as the stars, planets, comets, &c. History of actions is a continued relation of a series of memorable events.

History with regard to its matter, is either natural, sacred, civil, ecclesiastic, literary, or personal. Natural history, is a description of the singularities of nature; its irregularities and prodigies; and the alterations it undergoes in the birth, progress, end, and use of things. Sacred history, is that which lays before us the mysteries and ceremonies of religion, visions or appearances of the deity, miracles and other supernatural things, whereof God alone is the author. Civil history, is that of people, monarchies, states, communities, cities, &c. Ecclesiastic history, is that which gives an account of the rise and establishment of the several religions and churches, of the rise and progress of the various opinions sects and heresies, &c. Literary history treats of arts and sciences, their original progress, and of the persons who have been most remarkable in discovering and promoting them. Personal history, is that which gives the life of one or more single persons, and is the same with what is called biography.

History with regard to its form, is either simple, figurate, or mixed. Simple history, is that which is delivered without art or ornament; being only a bare, and faithful recital of things, in the manner and order wherein they passed. Figurate history, is that which is further enriched with ornaments, by the wit and ingenuity of the historian; by laying open the characters of the principal persons, the secret springs and motives of the several events, &c. Mixed history, is that which besides the recital and ornaments of figurate history, calls in the proofs and authorities upon which the facts are founded; furnishing authentic memoirs, or original letters, manifestos, &c. to vouch the truth of what is advanced. See HISTORIOGRAPHER.

*Credibility, foundation, and nature of HISTORY.* Some choose to define history, a true and well grounded account of

of past events ; a definition equally applicable to all the kinds of it : for tho' in some of them, as the history of nature and literature, we meet with accounts of qualities and opinions ; of works of nature and art ; yet these have no other relation to history than as they are events, and are deduced from observations on past changes. And as to the grounds on which the credibility of an history is founded, they are derived partly from the events related, and partly from the evidence and character of such as relate them ; whence arises an internal and external credibility.

The interior credibility consists not only in the possibility of the event reported, but likewise in its probability ; which last consists in this, that the circumstances in which an event is reported to have happened be conformable or suitable thereto, or that there be some foundation for it in the connection of the circumstances, and that in parallel cases the same had frequently happened. Hence it is easy to conceive, that many events may appear improbable, nay incredible to some, through mere ignorance, or by separating them from their circumstances. This is the case with the frequent charges of incredibility brought against those numerous armies we read of in antient history, from confounding the regular armies of the moderns, with the tumultuous ones of the antients ; which were a kind of militia composed of all or the greater part of the fighting men of a country.

Under the external grounds of credibility are comprehended the genuineness of the original testimony, and the capacity and integrity of those who relate it : the evidence alledged must not only be ascribed to its true authors, but these must appear to be persons so circumstanced and inclined as to relate the truth, so as to add to it nothing false, nor omit any thing of consequence to the event reported. The first of these, or the genuineness of the original testimony, affects not only books and tracts, but public records and monuments of past events, statues, inscriptions, columns, edifices, &c. And to detect the fraudulent practices of former times, in forging evidences of this kind, requires great knowledge in the history not only of human societies, but of the opinions, sciences, languages, and customs of different times. And hence appears the ne-

cessity of great penetration, and capacity in an historian ; but above all, of great integrity and sincerity in relating the truth.

In trying the credibility of an event by the number of evidences brought in support of it, we ought to weigh : 1. How many historians, and other known sources, are really extant of any particular event. 2. The actual diversity of their testimonies. 3. Their agreement and contradiction ; and whether they cannot be reconciled. 4. The exterior and interior credibility of the contradicting narrations.

From what has been said, we may draw the following inferences. 1. That there is a real and demonstrable certainty of events, which ought not to be doubted or contested : and, indeed, scepticism in historical matters most commonly, if not always, proceeds from ignorance of the real nature of that certainty and its criterion, or from a consciousness of the indispensable necessity of unwearied diligence, of farther helps, and deeper reflection in examining and proving, than the conveniency of many will allow. 2. That the demonstrability of a fact, the credibility of an historian who reports, and the evidences of his whole work, ought never to be confounded or mistaken for one and the same thing : for an historian may be well worth credit, tho' he be not infallible, and even though he has actually committed errors in some of his reports. 3. The demonstrability of events has different degrees and limits, as reaching only so far as the records preserved will permit : and hence appears the necessity of well distinguishing such events, the reality or falsity of which can be proved, from events that are at best uncertain and doubtful. 4. That the credibility of events may gain new strength is evident ; since many facts cannot be known, till after the death of such as were either the actors or persons concerned in them : besides it frequently happens, that records and vouchers of transactions, long since past, are afterwards discovered, which till then were either unknown, or could not be confidently published by those who knew them, for want of such witnesses and proofs. 5. The credit of history can never decay by age, as some have erroneously asserted ; since facts, once established upon good evidence, must ever remain so, while the vouchers of such evidence are pre-

served : nay an account which formerly was uncertain, or even considered as improbable or false, may be vindicated and proved by late discoveries of historical writings and records.

*Usefulness of HISTORY.* That great advantage may be reaped from the study of history, will appear from the following considerations. 1. It proves an agreeable amusement, and relaxation: for though the mind is not wholly unactive in the study of history; yet, being a lighter and more entertaining employment, the faculties of the mind, when fatigued and almost exhausted with more intense employment, find actual repose, and are recruited and restored to vigour. 2. But beside the pleasure of studying history, it lays a foundation not only for general prudence, but for that particular kind, which the circumstances and situation of each man require. To become acquainted with the characters of men, the marks, sources, and effects of their passions and prejudices, the power and changes of their customs, and the like, is an essential and necessary step to prudence: and all this knowledge is considerably improved by history, which teaches us to make other men's experience our own, to profit by it, and to learn wisdom from their misfortunes. 3. History is of eminent use in promoting virtue, partly by a copious and pleasant instruction in a right and virtuous conduct in general, and partly by examples that intensify lead us to the practice of several virtues in particular. 4. Every other science receives great benefit from history. Philosophy, and practical mathematics have recourse to history, or to nature, through the medium of history, for most of their objects; and in many parts of these sciences, the whole force of the demonstration is founded on experiments; which would make but an indifferent figure, if the assistance of other men's experiments by the means of history were excluded: and the same holds of divinity, law, medicine, &c.

*Method of studying HISTORY.* Persons who read history merely for amusement, or, having in view some particular branch of learning, attend only to certain branches of history, are not confined to that order and connection, which is absolutely requisite for obtaining a proper knowledge of history; the most regular, as well as successful way of studying which, is, to begin with an epitome of universal

history, and afterwards apply to the history of particular nations and common-wealths: for the study of particular histories presupposes, or, to speak more properly, is only extending the knowledge of particular parts of universal history. Unless this be our plan, we shall only fill the memory with some events; which may be done without applying to history, or pretending to the knowledge of it.

**HISTORY**, in painting, denotes a picture composed of divers figures, or persons, representing some transaction, either real or feigned. See **PAINTING**.

**HISTRIO**, in the antient drama, signified an actor or comedian, but more especially a pantomime, who exhibited his part by gestures and dancing. See the article **DRAMA**.

**HISTRIX**, the **PORCUPINE**, in zoology. See the article **PORCUPINE**.

**HISTRIX**, the **PORCUPINE-FISH**, in ichthyology, the rough spotted ostracion, or globe-fish, beset with frequent small spines.

It grows to about twelve inches in length, and to eight or nine in diameter. It is brought to us dried from the eastern seas, and has been sometimes caught in the Mediterranean. See plate **CXXXII**. fig. 5.

**HITCH**, in the sea language, is to catch hold of any thing with a hook or rope, and by this means to hold it fast: thus when a boat is to be hoisted in, the sailors say, hitch the tackles into the ring-bolts of the boat; and when they are about to weigh anchor, hitch the fish-hook to the fluke of the anchor.

**HITCHEL**, or **HATCHEL**. See the article **HATCHEL**.

**HITCHING**, a market-town in Hartfordshire, fourteen miles north-west of Hartford, and thirty-two north-west of London.

**HITHE**, or **HYTHE**, in our old writers, denotes a port, wharf, or small haven, to embark, or land wares at; as *Queen-lithe*, &c.

**HITHE** is also one of the Cinque Ports in the county of Kent, situated on the english channel, six miles west of Dover.

**HIVE**, *alvare*, in country affairs, a convenient receptacle for bees. See **BEE**. There are several sorts of hives used in different counties of England, as wicker-hives, made of privet; willow, or hart-hives, daubed with cow-dung tempered with dust; or hives made with straw

straw bound with brambles. Some also, out of curiosity to see the bees work, have them made of wood with glass-windows, or sides; but these are very cold, so that bees seldom thrive in them. The most usual form of them is coical, or bell-shaped; and the best and warmest materials for making them are straw and oser, nicely twitted and matted together. Of these there should be kept several sizes, so as to suit a bigger or lesser swarm; and where you design to multiply your stock, make use of the small ones, and of the larger where you desire a great deal of honey. See **HIVING**, and **HONEY**.

**HIVING** of Bees, the placing a swarm of them in a hive, provided for that purpose. See the article **HIVE**.

When a swarm of bees has left an old hive, and is placed in the form of a cluster hanging down from the branch of some tree or shrub, turn up the hive, and shaking the bough, make them fall into it, and then set the hive upon a cloth on the ground; or if the bough be small, you may cut it off, and laying it on the cloth, set the hive over it: but if the bees are fixed on a branch near the ground, lay the cloth under it, then shake them down and place the hive over them. If it happen that some bees will obstinately keep to the place where they at first fixed themselves, after having tried in vain to sweep them off gently with a brush, rub the branch with the juice of wormwood, rue, elder, or of such other plants as they hate the smell of, and if this does not succeed, linen rags must be burnt under them, the smoke of which will soon drive them off, and make them join their companions. It sometimes happens, that the swarm is not placed so favourably as in the instances before-mentioned; they often hang themselves in long clusters, on the small branches of high trees, and in this case, many different expedients are to be used to have them, according to the circumstances of their position. The common method is for one man to climb the tree with a long staff in his hand, and another to mount a ladder placed against the tree, and to hold the hive under the swarm, while the other sweeps them into it with the staff; and when the bough on which they hang is so far from the body of the tree, that this is impracticable by the ladder, the hive is to be fixed to the end of a long pole, and by that

means held under the swarm while they are swept into it. When all this is impracticable, by reason of the great height of the branch on which the swarm hangs, a large cloth is to be spread on some of the lower branches, and the whole swarm swept down in a cluster upon it; this is then to be thrown carefully to the ground, and another person is to be ready there to warm the hive over the greater part of the cluster, and the rest will soon creep into it, and join them. If they are slow in doing this, they are to be driven in by burning linen rags about the places where they fly, the disagreeable smell of which will send them towards the hive, where finding their companions not incommoded with it, they will naturally remain.

Sometimes the bees that go out in a swarm fix upon a hole in a wall, or a hollow in the trunk of a tree. This is a much better choice for them than the branch of a tree; but it is much worse for the person who is to have them, for they are very difficult to be got out. The common way is to attack these swarms in the middle of a cold night, to enlarge the opening from without, and placing the hive under it, to scoop the bees out with a ladle, and put them into the hive.

It sometimes happens, that the swarms part, and light in sight of one another; in which case, if the lesser part are disturbed, they will fly to the greater: but if they are not in sight of each other, have them both in two several hives, and shaking the bees out of one hive on the cloth on which the other hive stands, place that hive over them, and they will all take to it.

If your swarm happens after the middle of June, and are small, put two or three of them together, even whether they arise the same day, or several days after; for by thus uniting them, they will labour the more carefully, gather store of honey, and stoutly defend themselves against all enemies. As to the manner of uniting them in one hive, it is thus performed: having spread a cloth on the ground, near the stool on which this united swarm is to stand, set a pair of rebs, or two supporters for the hive; then in the evening when it grows dark, knock down the hive out of which you intend to remove your bees upon the rest; then lift up the hive a little, and clapping it between your hands to shake out the bees that stick in it, lay it down sideways by those insects,

and

and set the stock or swarm to which you would add them, upon the refts over them; upon which they will immediately afcend from the cloth underneath into the hive, and if any remains in the other hive, they will haften after their companions. When you have gotten them all in, place the hive on the ftool, which fhould be done either that night, or early the next morning. Some reckon it better to place the hive in which the fwarm is newly put, with a view to its being drove into another, with the fkirts up-permoft, and to fet the other upon it, binding them about the fkirts with a towel, and in this manner to let them ftand till the morning, by which time all the bees will have afcended, fo that you may then fet the receiver on a ftool. Thus three or four fwarms may be put together. But they ought to be united the fame evening after they have fwarmed; becaufe after having made combs, they are the more unwilling to part from them. In thefe feveral methods of hiving bees, people ought to defend themfelves as carefully as poffible againft their ftings; the feureft way of doing which, is to have a piece of gauze, or coarfe mullin, large enough to come over the perfon's hat, and to reach down to the collar of his coat behind, and to his breaft before, which being kept at a little diftance from his face by his hat, he may fee what he does without the leaft danger: he ought alfo to fecure his hands by wearing a good pair of gloves; and woollen ones are the beft for this purpofe.

**HOACHE**, in natural hiftory, a kind of earth approaching to the nature of chalk, but harder, and feeling like foap; whence fome think that it is either the fame with our foap-rock of Cornwall, or very like it. The Chinefe difsolve it in water, till the liquor is of the confiftence of cream, and then varnifh their china-ware with it.

**HOACTLI**, in zoology, the name of an american bird defcribed by Nieremberg: it is of the fize of a common hen, the legs and neck are long; its head is black, and is ornamented with a beautiful creft of the fame colour; its whole body is of a fine white, but its tail is grey, as are alfo the upper fides of its wings; the wings have a greenifh caft, and the back fometimes has many black feathers; its feet are not webbed, its legs are of a pale whitifh colour; it has a circle of white, beginning at the eyes, and going round the head: it is common on the lakes of

Mexico, and builds among reeds and fedge. It bites very defperately.

**HOAR-FROST**. See **FROST**.

**HOAR-HOUND**, or **HOREHOUND**, *marrubium*, in botany. See **MARRUBIUM**.

**HOARSENESS**, *rauvedo*, in medicine, a diminution of the voice, fometimes attended with a preternatural afperity, or roughnefs thereof.

The part here affected, is the afpera arteria, and its larynx, which laft chiefly forms the voice. See the articles **ASPERA ARTERIA**, and **LARYNX**.

The proximate caufe is too great an effufion of thin lymph upon the part. It is a catarrhal affection from a too fharp falt, or acid lymph. Etmuller, in a very obftinate hoarfenefs, prefcribes fpermaceti as an approved remedy; as alfo, decoct. raporum, and rob. paffulorum. In an inveterate hoarfenefs, where a vifcid mucus, or thick lymph is the caufe, difolving and expectorating medicines are convenient; and above all, fyrop de eryfimo, oxymel filitit. and balf. fulph. Bleeding is to be avoided, for it prolongs the diftemper.

Sometimes worms in theinteftines are the caufes of hoarfenefs.

**HOBBY**, the name of a hawk, called by authors *subbuteo*.

It is a hawk of the lure, and not of the fift; and is very like the faker, only much lefs. It makes excellent fport with net and fpaniels; for when the birds fee the hobby, they dare not commit themfelves to the wing, but lie clofe to the ground, and fo are taken in the nets.

**HOCHSTET**, a town of Swabia in Germany, fituated twenty-five miles north-eaft of Ulm.

**HOD**, an inftrument ufed to carry bricks and mortar in, up ladders, &c. to build or repair houfes, &c. with.

**HODMAN**, an appellation given to a young ftudent admitted into Chrift's College in Oxford, from Weftminfter-School.

**HODNET**, a market town of Shropfhire, ten miles north-eaft of Shrewfbury.

**HODSDON**, a market-town of Hertfordfhire, feventeen miles due north of London.

**HOE**, in country affairs, a tool made like a cooper's addz, to cut upwards in gardens, fields, &c. This tool is commonly called the hand-hoe: for other forts of hoes fee the next article.

This inftrument is of great ufe, and fhould be more employed in hacking and clearing the feveral corners, cracks and patches



patches of land, in spare times of the year, which would be of no small advantage thereto.

*Prong Hoe.* See the article **PRONG**.

**HOEING**, according to Tull, is the breaking and dividing the soil by tillage, whilst the corn, and other plants are growing thereon.

It differs from common tillage (which is always performed before the corn or plants are sown or planted) in the time of performing it; and it is much more beneficial to the crops than any other tillage. This sort of tillage is performed various ways, and by means of different instruments. See **PLOUGH**.

Land, which before tilling would have yielded little, tho' the more it is tilled before sowing, the greater plenty of crop it yields, yet if tilled only before the sowing will always have some weeds, and they will partake of the advantage of the tillage as well as the corn. This is one reason for an after tillage, such as that by hoeing. But there is another consideration that yet more requires it, this is, that as soon as the ploughman has done his business by plowing and harrowing the land after sowing, the soil of its own accord begins to undo it all again by tending towards its original texture and specific gravity, the altering of which was the only business of all the former tillage. The breaking the particles of the earth, and making in it new pores and new superficies, is the great business of the plough and harrow, but as soon as their use is over, the earth begins to coalesce again to its own form, the particles unite together, and the artificial pores in a great measure close up. The seed is nourished in a worse ground than it was at first put into, and the more the plant grows up and requires a larger supply of food, the worse the pasture becomes: while nourishment is thus denied the growing plants, they are at the same time choked with weeds, which being of a harder nature than they, will grow with less supplies, and therefore thrive more vigorously and rob them of a great part of the little food the land before allowed them.

Transplanting is nearly allied to hoeing, but it is much inferior; the nature of this will not admit of its being a general thing, and even if it would, hoeing is better, for by transplanting, the plants can only be kept up to a certain period, after which they will not bear it; but

hoeing may be used to them with advantage, to their utmost standing, and makes them vigorous all the while. The roots of a plant are necessarily broken off in transplanting, and it requires some time for it to strike a whole set of new ones, and if the earth about it is not kept thoroughly moistened all this time, the new formed roots will not be able to shoot, and the plant will starve in the midst of plenty; but on the contrary, in hoeing the same advantage of a new pasture for the plant is obtained by breaking the particles of earth, and at the same time no more of the roots are broken off than can easily be supplied, and the rest remaining in their places, the plant continues growing without that stop and decay which must happen on transplanting, and which it recovers only by degrees.

One great benefit of hoeing, is, that it keeps plants moist in dry weather, the advantage of which to their growth is easily seen. This good office it performs on a double account; first as they are better nourished by hoeing, they require less moisture, and consequently carry off less; for these plants, which receive the greatest increase, having most terrestrial nourishment, carry off the least water in proportion to their augment, as is proved by Dr. Woodward's experiments. Secondly, the hoe, particularly the horse-hoe, for the other does not go deep enough, procures moisture for the roots from the dew that falls most in dry weather, and these dews seem to be the most enriching of all moisture, as it contains in it a fine black earth, which will subside from it in standing, and which seems fine enough to be the proper pabulum or food for plants.

For a comparative view of the profits arising from the common and horse-hoeing husbandry. See **HUSBANDRY**.

**HOG**, *sus*, in zoology, a genus of quadrupeds, of the order of the jumenta, the characters of which are these: the upper fore-teeth are four in number, and are convergent; those of the lower jaw are eight, and are patulous: the canine teeth of the upper jaw are two, and very short; those of the under jaw are single, and exerted: the crown of the head is carinated, and the hoof is divided. See the article **SWINE**.

Besides the common hog, there are several other species, as, 1. The american hog, with the back bristly behind, and with

a naked tail. 2. The musk-hog, with a cyst, or gland on the back, in which is secreted a perfumed fluid; its tail is naked. 3. The babyroussa, with two teeth growing on the forehead.

**HOG'S DUNG** is, by Mortimer, reckoned one of the richest manures we are acquainted with, and the next in value to that of sheep's dung, and is found to be equal in virtue to twice the quantity of any other dung, except this. The antients seem to have been displeased with it, on account of its breeding weeds, but this is only accusing it of being too rich, for any dung will do this when laid too thick. It is an excellent manure for pasture-grounds, and excels all other kinds of dung for trees. The farmers who use this dung for their lands, generally take care to save it, by well paving the styes, and encrease the quantity by throwing in bean-stalks, stubble, and many other things of a like nature; and by good management of this kind many farmers have procured fifty or sixty loads of excellent manure a year, out of a small stye. The very best way of using this dung, is to mix it with horse-dung; and for this reason it is best to have the stye near the stable, that the two cleanings may be mixed in one heap, and used together. They have in many parts of Staffordshire a poor, light, shallow land, on which they sow a kind of white-pea: the land is neither able to bear this, nor any thing else, to advantage for their reaping; but when the peas are ripe, they turn in as many hogs as the quantity of pease will fatten, suffering them to live at large, and remain there day and night; in consequence of this the land will produce good crops of hay for several years afterwards; or if too poor for that, it will, at worst, raise grass enough to make it a good pasture-ground.

**HEDGE HOG**, *erinaceus*, in zoology, a genus of quadrupeds, the lateral fore-teeth of which are shorter than the others; the nostrils are ciliated; and the body, instead of hairs, is clothed, in the manner of that of the porcupine, with spines. See **QUADRUPED** and **PORCUPINE**.

Of this genus there are two species. 1. The erinaceous, with larger ears, or the common hedge-hog, being a little animal, considerably thick in proportion to its length, and which, when it draws itself together at the approach of danger, appears of an oval figure. The length of this creature is about seven inches; its

head small and oblong, broad towards the upper-part, and growing smaller towards the nose; the mouth is formed very much like that of the badger; the eyes are small, black, and protuberant; the ears are short and broad; the neck is short; the back broad and prominent; the legs short and robust; the feet formed like those of the dog; there are five toes on each, and one is shorter than the rest, in manner of a thumb. The other species is the white erinaceous, with very small ears, being larger than the common hedge-hog, but very like it in form.

**Musk-HOG**, *Tajacu*, in zoology. See the article **TAJACU**.

**HOG-STEER**, among sportsmen, denotes a wild boar three years old.

**HOG'S FENNEL**, a plant called by botanists *peucedanum*.

**HOG'S PLUM**, a plant otherwise called *Spondias*. See the article **SPONDIAS**.

**HOG'S WEED**, a plant called by Linnæus *boerhaavia*.

**HOGENHINE**, in our antient saxon laws, signifies one that came as a guest to an inn, and continued there the third night, from which time he was accounted of that family; so that if he offended against the king's peace, his host was to be answerable for him.

**HOGSHEAD**, in commerce, a measure of capacity, containing sixty-three gallons. See the articles **GALLON** and **MEASURE**.

**HOGUE**, a town and cape on the north-west point of Normandy in France, near which admiral Rook burnt the french admiral's ship called the *Rising-sun*, with twelve more large men of war: west longitude 2°, and north latitude 49° 50'.

**HOHIO**, a river of North America, which rising in the Apalachian mountains, near the confines of Carolina and Virginia, runs south-west, and falls into the river Mississippi.

**HOISE**, or **HOYSE**, a term used by seamen, for hawling up any thing into the ship, or the getting up a top-mast, yard, or the like.

**HOITLALLOTL**, in zoology, the name of an american bird, described by Nieremberg, and called by him *avis longa*. It is very remarkable for the swiftness of its running, and is of a very long shape, having also a long tail: its beak is also very long, black above, and grey underneath: its tail is green, and has all the splendor and beauty of the peacock's:

its

its whole body is of a whitish yellow, and, near the tail, of a blackish yellow; but the shoulders are black, with white spots. It does not fly high, nor very well, but runs so swiftly as is scarce to be conceived. It is but an ill tasted bird.

**HOKE-DAY**, the Tuesday after easter-week; which was the day on which the English conquered and expelled the Danes: this was therefore kept as a day of rejoicing, and a duty, called hoke-tuesday-money, was paid to the landlord, for giving his tenants and bondmen leave to celebrate it.

**HOLCUS**, **INDIAN MILLET**, in botany, a genus of the polygamia-monoecia class of plants, the corolla of which is a glume, furnished with a triple arista or awn; the stamina are three, the styles two, and the seed single.

**HOLD**, that part of a ship which lies between the keelson and the lower-deck; in which, divided by bulk heads, are the steward's room, powder room, bread-room, and the boatwain's and carpenter's store-rooms. In a merchantman, all the goods and lading in general, are stowed in the hold.

**HOLD-FAST**, a large piece of iron, in the shape of the letter S, fixed into a wall, to strengthen it. Also a tool used by joiners, carvers, &c. which goes through their benches, to hold fast such work as cannot be finished by its being held in the hand.

**HOLDE**, in old law books, signifies the bailiff of a city or town: and according to some writers, it also signifies a general.

**HOLDERNESS**, a peninsula in the east riding of Yorkshire, which has the German ocean on the east, and the river Humber on the south.

**HOLIBUT**, a name sometimes given to the turbot. See the article **TURBOT**.

**HOLLAND**, one of the United Provinces: it is about one hundred miles long, from north to south, and scarce thirty miles broad; but enjoys the greatest trade of any province in the world, and in point of strength and riches is equal to the other six united provinces. It is situated one hundred miles east of England, and is bounded on the north and west by the German sea, on the east by the Zuider-sea, and on the south by the provinces of Zealand and Utrecht.

**HOLLAND** is also the name of the south-east division of Lincolnshire.

**HOLLAND**, in commerce, a fine and close

kind of linen, so called from its being first manufactured in Holland. See the article **LINEN**.

**HOLLOW**, in architecture, a concave moulding, about a quarter of a circle, called by some a casement, and by others, an abacus.

**HOLLOW-SQUARE**, in the military art, a body of foot drawn up, with an empty space in the middle for colours, drums, and baggage.

**HOLLOW-TOWER**, according to Harris, is a rounding made of the remainder of two brisures, to join the curtain to the orillon, where the small shot are played, that they may not be so much exposed to the view of the enemy.

**HOLLY**, *aquifolium*, in botany, is ranked by Linnaeus among the ilices. See the article **ILEX**.

Holly-hedges make an excellent fence; but are liable to perish in severe winters. See the article **HEDGE**.

The timber of holly is the whitest of all hard wood, and therefore used by inlayers. It is also used by mill-wrights, turners, &c.

**Knee-HOLLY**, a name given to butcher's broom.

**Sea HOLLY**, a plant more usually called eryngium. See the article **ERYNGIUM**.

**HOLM** signifies an island in a river: also a hill or cliff.

**HOLM** is also a port and market-town of Cumberland, situated on Solway-frith, twenty miles west of Carlisle.

**HOLOCAUST**, a burnt offering, or sacrifice, wholly consumed by fire: of this kind was the daily sacrifice in the Jewish church. This was done by way of acknowledgment, that the person offering and all that belonged to him, were the effects of the divine bounty. The heathens, who also offered holocausts, probably considered them in the same light: and the disposing of sacrifices this way was the general custom, till Prometheus introduced the custom of burning only a part, and retaining the remainder for his own table.

**HOLOGRAPH**, among civilians, a will wholly wrote by the hand of the testator.

**HOLOMETER**, a mathematical instrument that serves universally for taking all measures, both on the earth and in the heavens.

**HOLOSTEUM**, in botany, a genus of the pentandria-trigynia class of plants, the corolla whereof is composed of five plane, patent, tridentated petals, broadest

towards the ends; the fruit is a cylindrico-conic capsule; the receptacle is free, obsoletely triquetrous, and has very short hairs; the seeds are numerous and triquetrous. There is a species of this genus, in which the stamina are only four instead of five.

**HOLSOM**, in the sea-language, is said of a ship that will ride well, without rolling or labouring.

**HOLSTEIN**, a dutchy of Germany, in the circle of Lower Saxony, one hundred miles long, and fifty broad. It is bounded by Sleswic or South Jutland on the north, by the Baltic sea and the dutchy of Sax-Lawenburg on the east, by the river Elbe on the south, and by the German sea on the west.

**HOLY-GHOST**, one of the persons of the holy Trinity. See **GOD** and **TRINITY**.

*Order of the HOLY-GHOST*, the principal military order in France, instituted by Henry III. in 1569. It consists of an hundred knights, who are to make proof of their nobility for three descents. The king is the grand-master, or sovereign, and as such, takes an oath on his coronation day, to maintain the dignity of the order.

The knights wear a golden-cross, hung about their necks by a blue silk ribbond, or collar. But before they receive the order of the Holy Ghost, that of St. Michael is conferred as a necessary degree; and for this reason their arms are surrounded with a double collar.

**HOLY-THURSDAY**, the same with ascension-day. See **ASCENSION**.

**HOLY-DAYS**, the same with festivals. See the article **FEAST**.

**HOLY-ROOD DAY**, a festival otherwise called the exaltation of the cross. See the article **CROSS**.

**HOLY-HEAD**, a cape and town in the isle of Anglesea, situated in the irish channel: west longitude  $4^{\circ} 45'$ , and north latitude  $53^{\circ} 26'$ .

**HOLY-ISLAND**, an island in the German sea, six miles south of Berwick upon Tweed: west long.  $1^{\circ} 42'$ , and north lat.  $55^{\circ} 45'$ .

**HOLY-WELL**, a town of North Wales, in Flintshire, ten miles east of St. Asaph.

**HOLYNESS** denotes purity, or a person free from sin.

**HOLYNESS** is also a title given to the pope, by those of his communion.

**HOMAGE**, in law, is the submission, loyalty, and service which a tenant promised to his lord, when he was first ad-

mitted to the land which he held of the lord in fee: also that owing to a king, or to any superior.

In the antient grants of lands and tene-ments in fee, the lord not only obliged his tenants to perform certain services, but likewise took a submission, with promise or oath that they should be true to him as their lord and benefactor.

The lord of the fee of lands, for which homage is due, takes it of every tenant as he comes to the land; but none can either do, or receive homage, except such persons as have estates in fee simple or tail, in their own right, or the right of another.

**HOMAGE AUNCESTREL**, is where a person and his ancestors, time out of mind, held land of the lord and his ancestors by homage. Such lord was to acquit his tenant against all other lords above him, and from all other service.

**HOMAGE-JURY**, a jury in a court-baron, consisting of tenants that do homage to the lord of the fee.

This jury makes enquiry into, and pre-sentments of defaults and deaths of tenants, and of admittances and surrenders into the lord's court.

**HOMAGER**, a person bound to do homage to another.

**HOMAGIO RESPECTUANDO**, a writ, by which the escheator was commanded to deliver lands to the heir of the king's tenant, notwithstanding his homage was not done.

**HOMAGIUM REDDERE** has been used to signify, to renounce homage; as where the tenant or vassal made a solemn declaration of disowning his lord, for which there was a form prescribed by the feudal-tory laws.

**HOMBERG**, a town of Germany, in the circle of the Upper Rhine, and landgraviate of Hesse, situated ten miles north of Francfort: east long.  $8^{\circ} 24'$ , north lat.  $50^{\circ} 20'$ .

**HOMBERG** is also a town of Germany, in the palatinate of the Rhine, and dukedom of Deuxponts: east long.  $7^{\circ} 6'$ , and north lat.  $49^{\circ} 20'$ .

**HOMER**, **OMER**, **CORUS**, or **CHOMER**, in jewish antiquities, a measure containing ten baths, or seventy-five gallons, and five pints, as a measure for things liquid; and thirty-two pecks and one pint, as a measure for things dry. The homer was most commonly a measure for things dry, and the greatest that was used among the Jews: it contained, according

ording to the Rabbins, ten ephaps, or thirty sata or saahs. Corus is the most usual term in the historical writers, and homer, omer, or chomer, among the prophets.

**HOMICIDE**, the slaying or killing a person. This is divided into two sorts, voluntary and casual: voluntary, is that which is done with deliberation, and a full purpose to kill; and, when done out of malice prepened, is murder: casual homicide, is where the death of a person happens by chance, or without any intention to kill; which is man-slaughter, or chance-medley.

**HOMILY**, in ecclesiastical writers, a sermon, or discourse, upon some point of religion, delivered in a plain manner, so as to be easily understood by the common people.

At the time of the reformation there were several of these homilies made and printed, and ordered to be read in such churches as were not provided with a sufficiently learned minister, in order to prevent unsound doctrine being taught in remote country places.

In the primitive church, homily rather meant a conference or conversation by way of question and answer, which made part of the office of a bishop, till the Vth century, when the learned priests were allowed to preach, catechize, &c. in the same manner as the bishops used to do.

There are still extant several fine homilies, composed by the antient fathers, particularly St. Chrysostom and St. Gregory.

**HOMINE ELIGENDO**, &c. in law, is writ directed to a corporation, for the election of a new person to keep one part of the seal, appointed for statutes-merchant, when a former party is dead.

**HOMINE REPLEGIANDO**, in law, is an antient writ that lies for bailing a person out of prison, where any one is confined without commandment of the king or his judges; or for any cause that is repleviable. This writ is directed to the sheriff, commanding him to replevy the prisoner.

In case a person takes away secretly, or keeps in his custody any person against his will, on oath made thereof, and a petition to the lord-chancellor, he will grant a writ of replegiari facias, upon which the sheriff returns an elongatus, and then there issues a capias in withernam, to take the party so offending.

**HOMINE CAPTO IN WITHERNAM**, in law,

is a writ for apprehending a person who has taken any other man or woman, and conveyed him or her out of the county, so that they cannot be replevied by law.

**HOMOCENTRIC**, the same with concentric. See the article **CONCENTRIC**.

**HOMOCHROA**, in natural history, a genus of fossils, consisting of stones composed of a crystalline matter, considerably debased by earth, and this of various kinds in the different species; but ever of one kind only in the same stone, which is thence always of one plain and simple colour, and never subject to veins or other variegations.

Of this genus authors reckon five species.

1. The white homochroum, from half an inch in diameter, to seven or eight inches. 2. The red homochroum, from one inch or less in diameter, to two or three. 3. The yellow homochroum of various sizes, from one inch or less in diameter, to six or seven. 4. The bluish homochroum, whose general size is two inches in diameter. And 5. The greenish homochroum, from half an inch to two inches in diameter.

All these species are of an orbicular form a compact and a close texture, and freely give fire with steel.

**HOMODROMUS VECTIS**, that kind of lever, in which the weight is in the middle, between the power and the fulcrum; or the power in the middle between the weight and the fulcrum.

**HOMOGENEOUS**, or **HOMOGENEAL**, an appellation given to things, the parts of which are similar or of the same nature and properties.

**HOMOGENEOUS LIGHT**, that whose rays are all of one colour and degree of refrangibility, without any mixture of others. See the article **COLOUR**.

**HOMOGENEOUS SURDS**, those which have the same radical character, or signs, as  $\sqrt[2]{a}$ , and  $\sqrt[2]{b}$ . See the article **SURD**.

**HOMOGENEUM COMPARATIONIS**, in algebra, is used by Vieta, for the absolute number in quadratic, cubic, &c. equations; which number always possesses one side of the equation, and is the product of the roots multiplied into one another. See the article **EQUATION**.

**HOMOLOGOUS**, in geometry, an appellation given to the corresponding sides and angles of similar figures, as being proportional to each other.

Thus, in two similar triangles ABC, DEF, (plate CXXXIII. fig. 1.) the sides

AB and DE, BC and EF, and AC and DF are homologous. And these triangles are to each other as the squares of their homologous sides. See the article TRIANGLE.

**HOMOLOGOUS THINGS**, in logic, those which agree in name, but are of different natures.

**HOMONYMOUS**, an appellation given to words which have two different significations, being the same with equivocal terms.

**HOMSOKEN**, a privilege enjoyed by every person, in his own house or home, which ought not to be invaded. See the article HAMSOKEN.

**HONAN**, a province of China, bounded by those of Xanfi and Pekin, on the north, by Xantong and Nankin on the east, by Suchuen on the south, and by Xenfi on the west; lying between  $33^{\circ}$  and  $37^{\circ}$  north latitude. Its capital is Caifum.

**HONDURAS**, a province of Mexico, in North America; which, including the country of the Moskito-indians, is situated between  $85^{\circ}$  and  $94^{\circ}$  west long. and between  $12^{\circ}$  and  $16^{\circ}$  north latitude.

**HONE**, a fine kind of whetstone, used for setting razors, pen knives, and the like. See the article COS.

Hones pay, on importation, a duty of  $9\text{ s. }6\frac{3}{4}\text{ d.}$  per hundred, and draw back  $8\text{ s. }7\frac{1}{2}\text{ d.}$

**HONEY**, *mel*, is, in general, a thick, viscous, and more or less fluid substance, of a whitish or yellowish colour, sweet to the taste, soluble in water, becoming vinous in fermentation, inflammable, liquable by a gentle heat, and of a fragrant smell.

There are three distinctions of honey, according to its purity, fluidity, and the manner in which it has been procured from the honey-combs. The first and finest kind is virgin-honey, or the first produce of a swarm, obtained from the combs without pressing; these being only set to drain, in order to its running out. The second kind is that known by the name of white-honey, being thicker than the former, and often indeed almost solid: it is procured by pressing the combs, but without the assistance of heat. The third and worst kind is the common yellow honey, obtained from the combs first heated over the fire, and then pressed.

Honey is prepared in the rectaria, or honey-glands of plants, situated in their flowers; the only office of the bees is to collect the small quantities lodged there,

and to amass them in stores capable of furnishing themselves with food, and us with a supply sufficient for our purposes. The bee that is out in search of honey, no sooner sees a flower that it likes, than it settles on it, and seizing on these glands, it sucks from them all the sweet juice they contain, which is either absolute honey, or very easily changed into such. The honey thus taken into the body of the bee, and deposited again into the cells of the honey-comb, is destined not only for the food of the young offspring, while unable to go out and help themselves, but for the sustenance of the bees themselves in bad weather, or when there is no food for them abroad.

Notwithstanding, however, that honey is known to be originally lodged in the flowers of plants, and might seem to be always ready in sufficient quantities for the bee; yet it is necessary that several circumstances concur, in order to its being fine and perfect in its kind. Among these are, a warm and serene state of the air, during the time in which the bees are most of all employed in making it, and a good state of health in the bee, as also its being made at a time when many fragrant plants are in flower, and in a place where such grow not too far off.

Honey taken out of the new combs early in the summer, is vastly preferable to that taken from the same hive in autumn. The reason of this is, that the bees, during the time of their making the former, have been in a more healthy and vigorous state, and that there have been fragrant flowers in greater number and perfection at that season, than later in summer.

Honey is an excellent pectoral, and is detergent, aperient, and diuretic. It should always be clarified, by melting it over the fire, either alone, or with the whites of eggs, taking off the scum, before it is used in medicine. The chemists pretend to have made an acid spirit from it, which is a solvent for gold; but we have only their assurance of it, no body else having ever seen such a liquor.

Honey, imported, pays  $7\text{ s. }8\frac{4}{10}\text{ d.}$  the barrel, and draws back  $6\text{ s. }9\text{ d.}$  Or each ton, imported, pays  $2\text{ l. }6\text{ s. }2\frac{4}{10}\text{ d.}$  and draws back  $2\text{ l. }0\text{ s. }6\text{ d.}$

**HONEY-COMB**, a waxen structure, full of cells, framed by the bees, to deposit their honey and eggs in. See BEE and WAX. The construction of the honey-comb seems one of the most surprising parts of the

the works of insects, and the materials of which it is composed, which, though evidently collected from the flowers of plants, yet do not, that we know of, exist in them in that form, has given great cause of speculation to the curious. The regular structure of the comb is also equally wonderful. When the several cells in it are examined, it should seem that the nicest rules of geometry had been consulted for its composition, and all the advantages that could be wished, or desired, in a thing of that kind, are evidently found in it. Each cell consists of six plane sides, which are all trapeziums, but equal to each other: the bottom of the cell is contrived with three rhombuses HKDI, DEFI, and FGHI (plate CXXXIII. fig. 2. n° 1.) so disposed as to constitute a solid angle at I, under the three equal angles DIH, DIF, and HIF, each of which is double the maximum angle of  $54^{\circ} 44' = DIK = DKI$ . Hence it comes to pass, that a less quantity of surface is sufficient to contain a given quantity of honey, than if the bottom had been flat, in the proportion of 4658 to 5550, as has been found by calculation; that is, nearly a fifth of the whole, so far as the figure in the end of the cells extends, in each; which fifth part of wax and labour saved, amounts to a vast deal in the whole comb. And if these admirable insects knew their advantage, they could not more nicely observe the rules of modern geometry. Hence we may observe, that though the rules of discovering the maxima and minima of quantities by fluxions, is a part of knowledge which the mathematicians have but lately acquired, and which they esteem the sublimity of human science, yet this very thing was imparted to these insects at the creation.

The method of making two sorts of cells in each comb, is also admirably contrived to save the expence of wax, since had they been made single, every comb must have had its peculiar base, and every set of cells their bottom of wax, whereas one bottom now serves for two cells; and there is but one plate of wax in the center of a double comb.

This structure occasions a very great sparing of the wax, or matter of the comb: but besides this there is another great advantage resulting from this structure, which is, that the angles arising from the forementioned combination of the bases, greatly strengthen the whole work.

The sides of the cells are all much thinner than the finest paper, and yet they are so strengthened by their disposition, that they are able to resist all the motions of the bee within them, as they are frequently obliged to be. The effect of their thrusting their bodies into the cells, would be the bursting of those cells at the top, were not this well guarded against. But to prevent this, the creatures extend a cord, or roll of wax, round the verge of every cell, in such a manner that it is scarce possible they should split in that particular part. This cord or roll is at least three times as thick as the sides of the cell, and is even much thicker and stronger at the angles of the cells, than else where, so that the aperture of each cell is not regularly hexagonal, though its inner cavity be perfectly so. See fig. *ibid.* n° 2.

The several combs are all placed parallel to one another (*ibid.* n° 3.) and there is such a space left between them, that the bees can easily pass: and often they place a part of the comb in a contrary direction to the rest, so that while the others are placed horizontally, these stand perpendicularly. The cells which have served, or are to serve for the habitation of the worms of the common, and of the male bees, are often made also at other times the receptacles of honey; but tho' these are indifferently made to serve either use, there are others destined only to receive honey.

The celerity with which a swarm of bees received into a hive, where they find themselves lodged to their minds, bring their works of the combs to perfection, is amazing. There are vast numbers at work all at once; and that they may not incommode one another, they do not work upon the first comb till it is finished, but when the foundation of that is laid, they go to work upon another, so that there are often the beginnings of three or four stories made at once, and so many swarms allotted to the carrying on the work of each. It would be a desirable thing to see the bees at work, in making these elegant and regular fabrics; but it is scarce possible to see any thing of this kind distinctly, even with the advantage of glass-hives; for, as Mr. Reaumur observes, no bee ever works singly upon this occasion, but wherever the fabric is erecting, there are numbers together trying to assist each other, and their motions are so swift, and so hid by their standing before one another,

that very little is to be seen of them. New bees are every moment going to the place, and old ones going away; and very frequently those which arrive late are dispatched away immediately after they arrive: there are only some very short moments in which the glass of the hives can give a view of the creatures regularly employed at their work; for the moment one sees a bee at work in building, that moment we see one either fly off, or else another get before her, so as to hinder the view: however, it is plain that the bee uses her teeth, in modelling and fashioning the wax.

**HONEY-COMB**, in gunnery, is a flaw in the metal of a piece of ordnance, when it is ill cast and spongy.

**HONFALIZE**, or the **HOFATISE**, a town of the austrian Netherlands, in the province of Luxemburg: east long.  $5^{\circ} 45'$ , and north lat.  $50^{\circ} 15'$ .

**HONFLEUR**, a port-town of France, in the province of Normandy, situated on the south side of the river Seyne, near the English channel: east longit.  $15'$ , and north lat.  $49^{\circ} 24'$ .

**HONITON**, a borough-town of Devonshire, twelve miles east of Exeter.

It sends two members to parliament.

**HONOUR**, a testimony of esteem or submission, expressed by words, actions, and an exterior behaviour by which we make known the veneration and respect we entertain for any one, on account of his dignity or merit. The word honour is also used in general for the esteem due to virtue, glory, and reputation. It is also used for virtue and probity themselves, and for an exactness in performing whatever we have promised; and in this last sense we use the term, *a man of honour*. But honour is more particularly applied to two different kinds of virtue, bravery in men, and chastity in women. Virtue and Honour were deified among the ancient Greeks and Romans, and had a joint temple consecrated to them at Rome: but afterwards each of them had separate temples, which were so placed, that no one could enter the temple of Honour, without passing through that of Virtue; by which the Romans were continually put in mind, that virtue is the only direct path to true glory. Plutarch tells us, that the Romans, contrary to their usual custom, sacrificed to Honour uncovered; perhaps to denote, that wherever honour is, it wants no covering, but shews itself openly to the world.

**HONOUR**, is also used for a signory or lordship, on which inferior lordships and manors depend; for as a manor consists of several lands, tenements, services, and customs, so an honour contains several manors, knights-fees, &c.

**HONOURS of the church**, are the rights and privileges belonging to the patron, &c. as a seat and sepulchre in the chancel, the being first served with the consecrated bread and wine, &c.

**HONOURS of the city**, are the public offices and employments thereof: thus he who has been constable, overseer of the poor, and churchwarden of his parish, common-council-man, alderman, and lastly mayor, has passed all the honours of the city. See the article **CITY**.

**HONOUR-COURTS**, are courts held within the honours or feignories.

**Funeral-HONOURS** are the ceremonies performed at the interment of the great, as hangings, hearses, funeral harangues, &c. See the article **FUNERAL**.

**Maid of HONOUR**, are six young ladies in the household of the queen, and prince's royal; the salary of those of a queen are 300l. per ann. each, and those of the prince's dowager of Wales, 200l.

**HONOUR-POINT**, in heraldry, is that next above the center of the escutcheon, dividing the upper part into two equal portions. See the article **POINT**.

**HONOURS and ruff**, a well-known game at cards, wherein all the duces are kept in the pack; by which means, as four play (two being of a side), twelve is dealt to each person, and there remain four for the stock, whereof the uppermost is turned up for trump; he that hath the ace of that suit, ruffs, that is, he takes in those four cards, and lays out four others in their place. The honours are the ace, king, queen, and knave; and he that hath three of these honours in his own hand, his partner not having the fourth, sets up eight by cards, that is two tricks; if he hath all four, then sixteen or four tricks; and here observe, that it is all one, if the two partners make three or four honours between them, as if one had them. If the honours are equally divided among the players, they then say, *honours are split*. If either side are at eight groats, any of the partners has the benefit of calling *can you?* provided he has two honours in his hand; and if his partner answers *one*, the game is up, which is nine in all: if he has more than two, he shews them directly, which answers the same



same purpose. However, if a trick be played before any of the gamesters call, they lose the benefit of *can you*, for that deal.

As to the value of the cards, the ace is the highest, then the king, queen, knave, ten, nine, &c. in order: but the least trump will win the highest card of any other suit.

In playing, vigilance and judgment do a great deal; for though you have but low cards, yet by playing them suitable to those in your partner's hand, so that he may either trump them, or play the best of that suit on the board, you may contribute much to gain the game. For this purpose, you ought to have a special eye to what cards are played out, by which means you will know what to play, if you lead, or trump securely and advantageously.

**HONOURARY**, something done or conferred upon any one, to do him honour. See the article **HONOUR**.

Honourary is sometimes understood of a person who bears or possesses some post or title, only for the name's sake, without doing any thing of the functions belonging to it, or receiving any advantage from it: thus we say, honourary counsellors, honourary fellow, &c.

Honourary is also used for a lawyer's fee; or a salary given to public professors in any art or science.

**HONOURARY SERVICES**, in law, such services as relate to the tenure of grand serjeantry, and usually annexed to honours.

**HONOURARY TUTOR**, a person of quality, appointed to have an eye over the administration of the affairs of a minor, while the onerary tutors have the real management of them.

**HOOD**, in falconry, a piece of leather, with which the head of a hawk, falcon, &c. is covered.

After a hawk is seeled, she should be fitted with a large easy hood, which is to be taken off and put on very often, watching her two nights, and handling her frequently about the head: when you perceive that she has no aversion to the hood, unseel her in an evening by candle-light, continuing to handle, hood, and unhood her as before, till at last she takes no offence, but will patiently endure handling: after unseeling, anoint with your finger and spittle, the place where the seeling-thread was drawn through; then hood her, and hold her on your fist all night; as soon as she is well reclaim-

ed, let her sit upon a perch, but every night keep her three or four hours on the fist; stroking, hooding, and unhooding her. This may also be done in the day-time, as soon as she has learned to feed eagerly, and without fear.

**HOOF**, *ungula*, the horny substance that covers the feet of divers animals, as oxen, horses, sheep, &c. See **HORN**.

A horse's hoof should be of a round, not longish figure; and its substance solid, tough, high, smooth, without any circles, somewhat shining, and of a dark colour, for that which is white is commonly brittle; in short, it ought to be of the colour of the hoof of a deer, and the whole foot round, but a little larger below than above, upright, and somewhat hollow on the inside, and so disposed that he may tread more on the toe than the heel.

The hoof of a horse is either perfect or imperfect: an imperfect hoof is one that wants any of the above qualities; and,  
1. May be broad and spreading out at the sides and quarters; such a horse has, for the most part, narrow heels, and will soon be flat-hoofed; he will neither carry a shoe long, nor travel far.  
2. Others are rugged or brittle-hoofed, which is a sign that it is too hot and dry. Some are long, which causes the horse to tread all upon his heels, and by that means to breed wind-galls.  
3. There are some crooked hoofs, broad on the outsides and narrow within, by which means the horse is splay-footed.  
4. Others have flat hoofs, and not hollow within, which give rise to the inconveniences above specified in the first sort of imperfect hoofs; but if it be too hollow, it will dry too fast, and make him hoof-bound.  
5. When the frush is broad, the heels will be weak and soft, and the horse will never tread boldly on the ground.  
6. Some have narrow heels; these are the tenderest of all, and the horse will grow hoof-bound.

**Bony Hoof**, is a round bony swelling, growing on the very top of a horse's hoof, which is always caused by some blow or bruise.

The method of cure is, first to digest the swelling, either with rotten litter, or hay boiled in stale urine, or with a plaster of stale wine-lees and wheat-flour boiled together, in order to ripen it, and bring it to suppuration, or to dissolve the tumour. If it come to a head, lance it in the lowest part of the softness, with a thin hot iron,

to let out the matter ; then tent it with turpentine, deer's suet, and wax, equal quantities of which should be boiled together ; and laying a plaster of the same salve over it, to keep in the tent till it be thoroughly well.

**HOOF-bound**, this disorder is a shrinking of the hoof at the top and at the heel, which makes the skin stare above the hoof, and grow over it.

This disorder may happen to a horse, either by keeping him too dry in the stable, by freight shoeing, or by some unnatural heat after foundering.

**HOOF-BRITTLE**, an infirmity in horses, proceeding either naturally, from the fire or dam ; or accidentally, from a surfeit falling down into the feet ; or from the horse's being formerly foundered.

For the cure, take unwrought wax, turpentine, sheep's suet, and hog's greafe, of each four ounces ; fallad-oil, a quarter of a pint ; and of dog's greafe, half a pound : boil them all together, and, with this mixture, anoint the hoof well for two or three days, especially at the setting on of the hair, and stop them with cow-dung and dog's greafe, melted together.

**HOOF-SWELLED**, a disorder that sometimes happens by a prick, or a young horse's being over-ridden, or too hard wrought, and which, if not speedily removed, will beget a wet spavin.

For the cure, take the strongest aqua fortis you can get, and first file or draw away the old hoof somewhat near, with a file or drawing-iron, then touch what is left of the hoof, three or four dressings or more, with the aqua fortis ; and anoint the foot with an ointment made of one pound of hog's greafe ; patch-greafe, three quarters of a pound ; venice-turpentine, five ounces ; new wax, three ounces ; and fallad-oil, three ounces ; all melted together over the fire : and by anointing the coffin of the foot quite up to the top, you will cause a new hoof to grow upon it.

**HOOF-LOOSENED**, a dividing of the horn or coffin of the hoof from the flesh, at the setting on of the coronet.

This disorder cannot be properly cured without the assistance of the farrier.

**HOOGSTRATEN**, a town of the austrian Netherlands in the province of Brabant, twenty miles north-east of Antwerp : east lon.  $4^{\circ} 45'$ , north lat.  $51^{\circ} 25'$ .

**HOOK**, a piece of iron or brass-wire bent and turned up at one end.

Hooks are a necessary sort of utensils, and being used for various purposes, are of several sorts : thus, boat-hooks (see pl. CXXXV. fig. 1. n<sup>o</sup> 1.) are for setting off boats ; can-hooks (*ibid.* n<sup>o</sup> 2.) are for hoisting casks into a ship : cant-hooks (n<sup>o</sup> 3.) are for turning or canting large masts, having at one end a ring for a hand-spike to go through, and at the other a claw ; laying-hooks (n<sup>o</sup> 4.) used by rope-makers, when laying of cordage ; rave-hooks (n<sup>o</sup> 5.) used by caulkers for picking the old oakum out of the seams of ships ; sheer-hooks (n<sup>o</sup> 6.) let into or put on the main and fore yards-arms of fire-ships, in order to fasten into an enemy's shrouds, sails, or rigging. Besides these there are draught-hooks, placed both behind and before the cheeks of a gun-carriage ; fish-hooks of several sizes, used for catching fish ; and a large sort in the same form, and called by the same name, used in ships for taking hold of the shank of the anchor, when it is to be hove up to the bow ; gamming-hooks, used when gammoning the bowsprit ; port-hooks, drove into the sides of a ship, to hang the ports upon ; puttock-hooks, for the plates to hook upon ; tackle-hooks, spliced into the straps of blocks, or ends of rope ; pot-hooks, to hang kettles or pots over the fire ; spinning-hooks, used by rope-makers to hang their threads on, as they spin them ; armour-hooks to lay arms upon, as guns, halberds, half-pikes, &c. chimney hooks, to set the tongs, fire-shovel, &c. against ; casement-hooks, curtain-hooks, hooks for doors, gates, &c. double line-hooks, single line-hooks, tenter-hooks, &c.

**HOOK-PINS**, are bolts made with a shoulder at one end, and used by carpenters in framing : these are drove through the mortices and tenants of the work, prepared for building or wharfing, *ibid.* n<sup>o</sup> 7.

**HOOKER**, in naval architecture, a vessel much used by the dutch, built like a pink, but rigged and masted like a hoy.

Hookers will lie nearer a wind than vessels with cross-sails can do. They are from fifty to two hundred tons burden, and with a few hands will sail to the East-indies.

**HOP**, *lupulus*, *humulus*, in botany, a genus of the *dioecia-pentandria* class of plants, neither the male nor female flower of which has any corolla ; the cup of the male flower is composed of five leaves ;  
that

that of the female is made up of only a single leaf, very large, and of an oval figure; the seed is single, roundish, covered with a coat, and contained within the cup.

Mortimer reckons four kinds of hops : 1. The wild garlic-hop. 2. The long and square hop. 3. The long white. And, 4. the oval hop. The first of these is not worth cultivating. The second is a good hop, but looking generally red towards the stalk, it will not fetch so good a price at the market. The long white hop is the most beautiful of all, and produces the greatest quantity : this kind and the oval will grow very well together. They delight in a deep rich garden-mould ; this may have sand among it, but never should have any clay : moory black land is what they are planted in, in Essex, but any light land will do. The hop sends its roots four or five yards deep, and for this reason it thrives best in that land where there is a good bottom below what is usually stirred, or manured, for agriculture. If the hop-land be wet, it must be laid up in high ridges, and drained in winter, that the roots be not rotted or chilled.

New land is found to succeed better with hops than old, and on this principle they are very cautious in their plantations in Kent, and look forward for the after-produce. When they make a new hop-ground, they plant it with apple-trees at a large distance asunder, and with cherry-trees between ; by this means when the hops have grown ten years, which they judge as much as they will do well, they place their account in the cherry-trees, which bear large crops ; these they gather for about thirty years, and then they cut them up, and depend upon their apple-trees only, which they find very large and strong by that time.

The dry stalks of hops should be burnt on the ground in winter, covering them with a little fresh earth as they burn. This makes together an excellent compost, to make the hills of. The land must be dug or plowed well, and laid very even, and then the places for the hills marked out by a line, and a stick put in every place where one is to be. A thousand hills may be made in an acre of ground, and six or seven plants set on every hill. From six to nine feet should be allowed between every hill, and the grounds in the hills should be better and richer than the common earth. Some plant hops in

March and April, but the most experienced people prefer the month of October, because they will then strike firm roots, and be strong and vigorous against spring. The largest plants are to be chosen ; and it is best to procure them from some rich ground, where the hills have been laid high ; they should be about eight or ten inches long, and have three or four joints or buds a-piece ; the holes for planting them are to be dug eight or ten inches deep, and about a foot over, and in each of these holes four plants are to be set, one in each corner : they may be covered an inch deep over the top, if planted in October ; but in spring, when they have shot from the joints, then they must not be buried : after this, the ground must be carefully kept clear of weeds.

*Dressing of Hops.* This is preparing the ground in winter and spring for the making a good summer-crop. In doing this, the hills upon which the plants stand must be all pulled down, and undermined on every side, till the spade comes near the principal root ; then shake off or remove with the hand the loose mould from the upper or loose roots, that you may see where the new roots grow out of the old sets. The old sets are to be carefully preserved, but the other roots may be cut away. Whatever time the hills are pulled down, the roots must not be cut till March. When the young hops are dressed for the first time, all the roots are to be cut away that grew the year before, and the sets are to be cut off within one inch of the same ; and every year after, they must be cut as close as may be to the old roots ; but to a weak hop, some of the shoots are to be left at the dressing. Those roots of the plant which grow downwards, are never to be injured, but only those which run horizontally are to be cut. The old roots and the young ones may be easily distinguished, in that the old ones are always red, and the young white. If there are by accident any wild hops got among the rest, the places where they grow are to be marked with sticks, or otherwise, at the time of their being gathered ; and after this, at the time of dressing the ground, that whole hill is to be destroyed, and a new one made with new plants in the room of it. When the roots are cut and dressed, the rich compost is to be put to them ; and the hills must not be made too high at first, lest they hinder the young shoots.

*Gathering and drying of Hops.* Hops blow in the latter end of July, in the beginning of August they bell, and they are sometimes ripe at the beginning of September, sometimes later. When they begin to change colour, are easily pulled to pieces, and their seeds look brown within them, they are ripe, and they are then to be gathered as quick as possible, for the least blast of wind will hurt them at this time.

The manner of gathering hops, is to take down four hills standing together in the midst of the garden, and to cut the roots even with the ground, then lay the ground level, and when it is swept clean, it makes a floor, on which the hops may be laid and picked. The hop-plants are first unwound from the poles, and then the people sit round and pick off the hops into baskets.

Care should be taken to dry the hops as fast as they are picked, for in lying undried they are apt to heat and change colour very quickly. If the quantity picked be so large that the kiln, in which they are to be dried, is over stocked, they must be spread thin upon a floor, and they will keep two or three days in that manner, without any harm. Indeed, where the quantity is but small, there is no need to have recourse to the kiln at all, for they will dry much better than any other way, by being laid thin upon a floor, and often turned. The drying of hops is the most material part of their manufacture; for if they be ill dried, they lose all their agreeable flavour; and great caution should be used, that they be all equally dried.

*Bagging of Hops* a term used by the farmers, who cultivate hops, for the last thing they have to do with them, in order to bring them to market; that is, the putting them up in large bags of coarse cloth, for carriage. When the hops have been picked and dried in the oost, or tin-floor, they are so brittle that they would break to pieces and be spoiled if they were immediately to be put up; they are therefore to lie together three weeks, or thereabouts, that they may become tough: if they are covered from the air by blankets in the heap, they may be bagged much sooner than if left open.

The manner of bagging them is this: a hole is made in an upper-floor, so large that a man may easily go up and down it; then a hoop is fitted to the mouth of the bag,

and so firmly sewed on, that it cannot be torn off; the bag is then let down thro' the hole, and the hoop remaining above, stops it from being pulled quite thro', being larger than the hole: a few hops are to be first thrown into the bag, and a person below is to take up a parcel of these in each corner of the bag, tying it with a packthread, this makes a sort of tassel, by which the bags are afterwards the easier managed and turned about. When this is done, one man must go down into the bag, and, while another casts in the hops, he must tread them down equally every way with his feet; when the bag is in this manner filled, it is to be ripped from the hoop, and sewed up, leaving two tassels at the corners, as at the bottom. A bag of hops thus prepared, may be kept for several years in a dry place.

The tops of this plant, being of a cooling quality, are eaten, when boiled, as an emollient. A decoction of hop-flowers is also accounted an antidote against poison, and cures the itch, as well as the sy-rup thereof, and is esteemed excellent in choleric and pestilential fevers. The heads and tendrils are good in the scurvy and most cutaneous diseases. Juleps and apozems are also prepared with hops for hypochondriacal and hysterical affections, and to promote the menses: but the chief use of this plant consists in preserving beer and other malt-liquors (in which the flower of this plant is a principal ingredient) from turning fower, and rendering it wholesome and grateful to the taste, &c.

Hops, the hundred weight, pay, on importation, 5l. 4s. 6d. and on exportation draw back 3l. 9s. 4½d. but if exported to Ireland, there is no drawback.

*HOPE*, or *Cape of Good-HOPE*. See the article *GOOD-HOPE*.

*HOPLITES*, in antiquity, an appellation given to such of the candidates at the olympic games, as ran races in armour.

*HOPPER*, a kind of basket, wherein the seed-corn is carried at the time of sowing. See the article *SOWING*.

It is also used for the wooden trough, in a mill, into which the corn is put to be ground. See the article *MILL*.

*HORARY*, something relating to an hour. Hence

*HORARY*, or *HOURLY*, or *HOURLY-CIRCLE of a globe*, is a small brazen circle, fixed upon the brazen meridian, divided into twenty-four hours,

hours, having an index moveable round the axis of the globe, which, upon turning the globe fifteen degrees, will shew what places have the sun an hour before or after us: for instance, if the index of the hour-circle be set at the upper XII. when the globe is rectified for London, and the globe turned 15 degrees from east to west, the index will point at the hour of I. which shews that all places under that meridian, and particularly Naples, have the sun an hour sooner than London has it: on the contrary, let the index be set at the upper XII. again, and the globe be turned 15 degrees from west to east, the index will point at XI. because all places under that meridian, particularly the Madeira-islands, have the sun an hour after London has it. For the several problems performable on the globes, by means of the horary circle, see the article **GLOBE**.

**HORARY CIRCLES, or LINES**, in dialling, are the lines or circles which mark the hours on sun-dials. See **DIAL**.

**HORARY MOTION of the earth**, the arch it describes in the space of an hour, which is nearly 15 degrees, though not accurately so, as the earth moves with different velocities, according to its greater or lesser distance from the sun. See **EARTH**.

**HORD**, in geography, is used for a company of wandering people, which have no settled habitation, but stroll about, dwelling in waggons, or under tents, to be ready to shift as soon as the herbage, fruit, and the present province is eaten bare: such are several tribes of the Tartars, particularly those who inhabit beyond the Wolga, in the kingdom of Astracan and Bulgaria.

A hord consists of fifty or sixty tents, ranged in a circle, leaving an open place in the middle. The inhabitants of each hord usually form a military company or troop, the eldest whereof is commonly the captain, and depends on the general or prince of the whole nation.

**HORDEOLUM, or CRITHE**, in medicine, a tubercle in the upper part of the eye-lid near the eye-brows, like a grain of barley, whence it takes its name; but it is commonly called a flye. For the cure of an hordeolum, Allen orders it to be covered over with white wax, or anointed with hen's grease, or fasting spittle; or to rub it with the body of a fly, the head being thrown away; or with the blood of a dove or partridge. If all these prove ineffectual, it must be extirpated

by cutting, or consumed by a liquid caustic; after which, let the plaster of the abbot de Grace be applied.

**HORDEUM, BARLEY**, in botany, a genus of the *triandria-trigynia* class of plants, the corolla whereof consists of two valves; the inferior valve is angular, of an ovato-acuminated figure, bellied, and longer than the cup, and terminates in a very long arista; the anterior valve is lanceolated, plane and smaller; the corolla serves as a pericarpium, surrounding the seed, and not letting it out; the seed is oblong, ventricose, pointed at each end, and marked with a longitudinal furrow.

For the culture and great use of this plant, see the article **BARLEY**.

For the bounty on the exportation of barley, see **CORN**.

**HORDICALIA, or HORDICIDIA**, in antiquity, a religious feast held among the Romans, wherein they sacrificed cattle big with young. This feast fell on April 15, on which day they sacrificed thirty cows with calf, to the goddess Tellus, or the Earth: part of them were sacrificed in the temple of Jupiter. The calves taken out of their bellies were burnt to ashes at first by the pontifices, afterwards by the eldest of the vestal virgins.

**HOREHOUND, marubium**, in botany. See the article **MARUBIUM**.

**Stinking HOREHOUND, ballotta**, in botany. See the article **BALLOTTA**.

**Bastard-HOREHOUND**. See the article **MARUBIASTRUM**.

**Base-HOREHOUND**, a name given by some to stachys. See the article **STACHYS**.

**Water-HOREHOUND, lycopus**, in botany. See the article **LYCOPUS**.

**HORIZON**, in astronomy and geography, that great circle which divides the heavens and the earth into two equal parts, or hemispheres, distinguishing the upper from the lower. See **SPHERE**.

The horizon is either sensible or rational. The sensible horizon is that circle, which, being discovered by our senses, limits our prospect. See the article **CIRCLE**.

When we are on terra firma, this circle commonly seems rugged and irregular, occasioned by the unevenness of the ground: but at sea, there are no such irregularities. The semi-diameter of this circle, varieth according to the height of the eye of the observer. If a man six feet high stood upon a large plain, or the surface of the sea, he could not see above three miles round.

The rational, or true horizon, is a great circle of the apparent celestial sphere, dividing it into two equal hemispheres, and serving as the limits of elevation or depression of celestial objects. This horizon being parallel to the sensible horizon, is distant from it by the semi-diameter of the earth, through whose center it passes: for the astronomers reduce the appearances of the heavens to a spherical surface, which is not concentric to the eye, but to the earth.

It divides the heaven and earth into two parts, the one light, and the other dark, which are greater or lesser, according to the condition of the place, &c. It determines the rising and setting of the sun, moon, or stars, in any particular latitude; for when any of these appear just at the eastern part of the horizon, we say, it rises; and when it does so at the western part, we say, it sets. And from hence also the altitude of the sun or stars is accounted, which is their height above the horizon.

This circle is divided by astronomers into four quadrants, or cardinal points. See the article COMPASS.

The poles of this horizon are the zenith and the nadir: and the innumerable circles drawn through these poles to the horizon, are called the vertical circles, or azimuths. See the articles ZENITH, NADIR, and AZIMUTH.

These two horizons produced to the fixed stars, will appear to coincide into one, since the earth, compared to the sphere in which the fixed stars appear, is but a point; therefore the two circles, which are but a point distant from each other, may be well considered as coinciding into one.

**HORIZON of a globe.** See the article GLOBE.

**HORIZONTAL**, something relating to the horizon; or that is taken in, or on a level with the horizon: thus we say, an horizontal plane, &c.

**HORIZONTAL DIAL**, that drawn on a plane parallel to the horizon, having its style elevated according to the altitude of the pole, in the place it is designed for. See the article DIAL.

**HORIZONTAL DISTANCE.** See the article DISTANCE.

**HORIZONTAL LINE**, in perspective, a right line drawn through the principal point parallel to the horizon; or it is the intersection of the horizontal and perspective planes. See the article PERSPECTIVE.

**HORIZONTAL PARALLAX.** See the article PARALLAX.

**HORIZONTAL PLANE**, that which is parallel to the horizon of the place, or nothing inclined thereto.

The business of levelling is to find whether two points be in the horizontal plane, or how much the deviation is.

**HORIZONTAL PLANE**, in perspective, a plane parallel to the horizon passing thro' the eye, and cutting the perspective plane at right angles.

**HORIZONTAL PROJECTION.** See the article PROJECTION and MAP.

**HORIZONTAL RANGE**, or **LEVEL RANGE**, of a piece of ordnance, is the line a ball describes, when directed parallel to the horizon, or horizontal line.

The horizontal ranges are the shortest: some pieces of cannon will make them six hundred paces, and some but one hundred and fifty; and the ball with the range of six hundred paces, will go from nine to thirteen feet in the earth. See the article GUNNERY.

**HORIZONTAL REFRACTION.** See the article REFRACTION.

**HORIZONTAL SHELTERS**, among gardeners, are defences disposed parallel to the horizon, for tender plants, blossoms, and fruits, in the spring, to defend them against blasts, and pinching nights.

Horizontal shelters, says Miller, have by some persons been greatly recommended to preserve fruit-trees, but with how little reason, or upon what slight experiments, every one that has ever made use of them will easily judge, especially those which are contrived by placing tiles in the walls, at certain distances; nothing being more obvious than that vegetables, when prevented from receiving the advantages of dews, rains, &c. these kindly benefits of heaven, grow weak, languid, and at last entirely decay: and from numbers of experiments, which have been lately made, we find that trees imbibe great quantities of nourishment through the pores of their leaves and branches, whereby they are rendered vigorous and healthy, even in such seasons, and upon such soils, where one would think it impossible they should receive much nourishment from the earth: to deprive them of this advantage, therefore, is no less than destroying them.

The only sort of shelter Mr. Miller approves of, for fruit-trees, is that made with two leaves of slit-deal, joined over each other, and a nted; these being fixed

ed upon the top of the wall, with pullies, to draw up and down at pleasure, form a sort of penthouse, which are let down in great rains, or cold nights, during the time that the trees are in flower, or the fruit is setting. But then, he observes, that these shelters should be removed away soon after the fruit is set, so that the trees may enjoy all the advantages of rain, dew, &c. in the summer, which are absolutely necessary to have healthy trees, or good fruit.

**HORMINUM, CLARY**, in botany, a genus of the *didynamia-gymnospermia* class of plants, reckoned by some a species of baum; the flower of which is monopetalous and ringent; the upper lip is hollow, and femibifid: the seeds are four in number, and contained in the cup. See plate CXXXV. fig. 2.

An infusion or decoction of clary, is esteemed good in the fluor albus, colic, flatulencies of all kinds, and hysterical complaints.

This plant is also said to be an antispasmodic, good against epilepsies, and in great esteem as a provocative to venery. It has also been commended as a vulnerary, and its juice is an ingredient in some ointments and plasters.

**HORMINUM** is also used as a species of sage. See the article **SAGE**.

**HORN, cornu**, in physiology, a hard substance growing on the heads of divers animals, particularly the cloven-footed quadrupeds; and serving them both as weapons of offence and defence.

The casting of the horns of deer is a singular phenomenon, the true reason of which seems to be a stoppage of the circulation; so that being deprived of the nourishing juice, they fall off much in the same manner as the leaves of trees do in autumn. About ten days after the horns are cast, the new ones begin to appear: these at first are soft and hairy, but they afterwards grow hard, and the creature rubs off the hair.

Horns make an article of commerce. Those of oxen or cows, imported, pay a duty of 1s. 7 $\frac{1}{2}$ <sup>0</sup>d. per hundred, and draw back on exportation, 1s. 5 $\frac{1}{2}$ <sup>0</sup>d. Those of harts or stags, pay on importation 5s. 9 $\frac{1}{2}$ <sup>0</sup>d. per hundred, and draw back 5s. 1 $\frac{1}{2}$ <sup>0</sup>d.

**HORN** is also a musical instrument of the wind-kind, chiefly used in hunting, to animate the hunters and the dogs, and to call the latter together.

The french horn is bent into a circle, and goes two or three times round, growing gradually bigger and wider towards the end, which in some horns is nine or ten inches over.

**HORN**, in architecture, sometimes denotes a volute. See the article **VOLUTE**.

To give a stroke with the **HORN**, among farriers, is to bleed a horse in the roof of the mouth with the tip of a stag's horn.

**HORN of plenty**. See **CORNUCOPIA**.

**HORNS of insects**, the slender oblong bodies projected from the heads of those animals, and otherwise called antennæ, or feelers.

The horns of insects are extremely various; some being forked, others plumose or feathered, cylindrical, tapering, articulated, &c.

As to the use of these parts, some have imagined they served to wipe and defend the eyes; others, that they served as feelers, lest the creature should run against any thing that might hurt it; and others there are, who think them the organs of smelling.

**HORN-BEAM, carpinus**, in botany. See the article **CARPINUS**.

**HORN-COOT**, a name sometimes given to the great horn owl. See **BUBO**.

**HORN-FISH**, a species of acus, otherwise called gar-fish. See the article **ACUS**.

**HORN-WORK**, in fortification, an out-work composed of two demi-bastions, joined by a curtain. See plate CXXXIII. fig. 4.

Its construction is very simple. From C the angle of the half-moon, they lay off eighty-eight fathoms to D; and on the center C, with the radius CD, describe the arch FDG, on which laying off DF DG each equal sixty fathoms, and drawing FG, this will be the exterior side of a polygon, whereon the two demi-bastions may be described in the usual way. The parapet of the horn-work is the same with that of the half-moon, and its moat is  $\frac{2}{3}$  of the great moat. Its curtain is usually defended by an half-moon, whose moat is  $\frac{2}{3}$  of that of the great half-moon, before the curtain of the place.

According to Vauban, none of the out-works is equal in strength to the horn-work, if placed before the bastion, and not as usual before the curtain.

**HORN-GELD**, a tax paid for feeding of horned beasts in the forest. See **FOREST**.

**HORNET, crabro**, in zoology, a species of apis with a black thorax, and double black spots on the segments of the body. See the article **APIS**.

**HORNET-FLY**, a two-winged fly, so called from its resemblance to the hornet.

**HORNSEY**, a market-town of the east riding of Yorkshire, thirty-five miles east of York.

**HOROGRAPHY**, the same with dialling. See the article **DIALLING**.

**HOROLOGIUM**, a general name for instruments to measure the hours, as a watch, clock, dial, &c. See the articles **WATCH**, **CLOCK**, &c.

**HOROPTER**, in optics, a right line **AB** (plate **CXXXIII**. fig. 2.) drawn through the point **C**, where the two optic axes, **HC** and **IC**, meet, parallel to the line **HI** which joins the centers of the two eyes, **H** and **I**.

It is called horopter, as limiting the bounds of distinct vision. See **VISION**.

**HOROSCOPE**, in astrology, is the degree of the ascendant, or the star that rises above the horizon at a certain moment, which is observed in order to predict some future event, as the success of a design, the fortune of a person who was at that instant born, &c.

The same name is also given to a scheme or figure containing the twelve houses, in which are marked the situation of the heavens and stars, in order to form predictions. See **HOUSE**.

**Lunar HOROSCOPE**, the point from whence the moon proceeds when the sun is in the ascending point of the east.

**HORSE**, *equus*, in zoology, a well known quadruped, the characters of which are these: the fore-teeth are six in number, the upper ones incurvated, and the inferior prominent: the canine teeth are not exerted, and are on each side separated by a space from the teeth: the hoof is undivided, and the teats are two, and placed in the groin.

The horse is one of the noblest quadrupeds we are acquainted with. In strength and natural fierceness, he is inferior to few, and yet easily tamed. The head is long, and large; the eyes large, and prominent; the ears erect, and beautiful; the neck is long and thick, and elegantly decorated with a mane; the body is rounded, and beautifully turned; the legs are strong, without being bulky; and the tail is long, and hairy all the way; the hairs being like those of the mane, only longer, thicker, and more beautiful.

Foreign horses or mares on their being landed in this kingdom, pay a duty of 11. 18s. 6d. and on their exportation, a

draw-back is allowed of 11. 13s. 9d. But British horses, mares, and geldings, on their exportation, pay only 5s. each.

**Hunting-HORSE**, ought to have a large, lean and long head, open ears, small, and standing upright; a forehead long, broad, and rising in the middle, like that of a hare; his eyes should be full, large, and bright; his nostrils wide and red within; his mouth large, deep in the wiles, and hairy; his thropple or wind-pipe large, loose, and straight when he is reined in with the bridle; his head should be set on his neck in such a manner, that a space may be felt between his neck and his choul; his crest should be firm, thin, and well raised; his neck long and straight, yet not loose and pliant; his breast strong and broad; his chest deep; his chine short; his body large; his ribs round like a barrel, his belly being hid within them; his fillets large; his buttocks rather oval than broad; his cambrels upright, and not bending; his legs clean, flat and straight; his joints short, well knit, and upright, especially betwixt the pasterns and the hoof, and with but little hair on his fetlocks; his hoofs black, strong, and hollow, and rather long and narrow, than big and flat; and his mane and tail long, and rather thin than thick. As to marks or colours, some do not scruple to affirm, that wherever a horse is met with that has no white about him, especially in his forehead, tho' he be otherwise of the best reputed colours, as bay, black, sorrel, he is of a dogged disposition, especially if he has a small pink eye, a narrow face, and a nose bending like a hawk's bill.

**HORSE-RACING**, a diversion more used in England than in all the world beside. Horses for this use should be as light as possible, large, long, and well shaped, nervous, of great mettle, and good wind, with small legs, and neat small shaped feet.

The rider ought to place himself on the horse with his knees firm, and his stirrups just at such a length, that when his feet are thrust home in them, he can raise himself a little in his saddle; for without that allowance, his legs will not be firm when he comes to run; the counterpoise of his body must be forward, to facilitate the horse's running, and his elbows close to his body; he must not sway to this side or that, but must take great care of his seat and hand; he should also take care not to hold himself by the bridle,



bridle, and not to twitch it back upon any occasion.

A plate being to be run for, every man that rides must be the just weight both at starting and at the end of the same heat: for if any one wants weight at coming in, he loses the heat, even tho' he came in first horse. Half an hour is allowed between every heat to rub down the horses, and at the warning of the drum and trumpet, the jockeys are to mount. If the same horse wins too heats running, or two heats out of three, he wins the plate; but if three heats are won by three different horses, a fourth is run, when he that wins two of the heats gains the plate. In these races, where there are more heats than one, it is sometimes a piece of policy in a rider to lose a heat, and for the ease of the horse to lie behind all the way, as much as he can, provided he brings him in within the distance-post: but when there is only a single heat to be run, he must push for all at that one time.

Horse-races are to be begun and ended the same day, and no plate, except the king's plates, shall be run for, that is under 50*l.* value, on the penalty of 200*l.* It is also ordained, that only one horse shall be entered by one person for the same plate, and if any person enters more, all the others will be forfeited. 13 Geo. II. c. 19.

*Backing a HORSE*, the breaking him to the saddle, or bringing him to endure a rider.

When this is done, which should be on some light plowed grounds, care must be taken that all the tackling be good and firm, and every thing in its due and proper place; then a person is to hold his head, and another to mount him; but this must not be done suddenly, or at a jerk, but very gradually and slowly, by several half risings and heavings. If he bears this patiently, the person is to seat himself firmly on his back; but if he be troublesome, and not tamed enough, the person is to forbear the attempt to mount, and he is to be trotted hard in the hand over the said plowed lands again, till he is willing to receive the rider quietly on his back. When this is done, the person who is on his back must cherish him, and the man who has his head must lead him a few paces forward; then he is to be cherished again. The feet are to be fitted well in the stirrups, and the toes turned out; afterwards the rider is

to shrink and move himself in the saddle, and the person who holds his head, is to withdraw his hand a little farther from the mouth. As the rider moves his toes forward, the holder must move him forward with the rein, till he is made to apprehend the rider's motion of body and foot, which must always go together, and with spirit, and will go forward without the other's assistance, and stay upon the restraint of the rider's hands.

When this is accomplished, let him be cherished, and have grass and bread to eat; and then let the rider mount and alight several times, cherishing him between each time; and thus he is to be managed till he will go on, or stand still at pleasure. This being done, the long rein may be laid aside, and the band about the neck, which are always used on this occasion, and nothing will be necessary but the trenches and cavesson, with the martingal. A groom must lead the way before; or another horse going only straight forwards, and making him stand still when desired. In this manner, by sometimes following, and sometimes going before another horse on the trot, the creature will by degrees be brought to know that it is his business to be quiet and governable.

*HORSE-SHOES*, plates of iron used for the defence of horses' feet. These are of several sorts.

1. That called the planch-shoe, or pancetlet. This shoe is exceeding good for a weak foot, as it keeps it from stones and gravel, and will last longer than any shoe: but it is said to make a good foot and bad leg, because it causes the foot to grow beyond the measure of the leg.

2. Shoes with calkins. These are intended to keep the horse from sliding; but however they do him more harm than good, because they prevent his treading even on the ground, by which means he is in danger of straining his foot, especially in stony places. Some indeed do not think a horse well shod, unless all his shoes be made with calkins, either single or double; the double ones are however less hurtful; for he will tread even with them than with those that are single; but then they must neither be too long nor sharp-pointed, but rather short and flat.

3. Shoes with rings. These were invented to make a horse lift his feet high, and were designed for horses that have tender hoofs: but what was intended for

a remedy, is highly prejudicial; for by adding either calkins, or these rings to his shoes, his heels are made weaker than they were before.

4. Shoes with swelling welts, or borders round them. These being higher than the heads of the nails, save them from wearing; and, if made of well-tempered iron, are both the best and most lasting shoes.

5. Some in passing mountains, where smiths are not easy to be met with, carry shoes about them, with vices to fasten them to the horse's hoofs, without the help of hammer or nail; but tho' this sort of shoe may save the horse's feet from stones, yet they pinch his hoof, and perhaps do him more injury than the stones themselves would do. On such occasions it is better to make use of the following shoe.

6. The joint-shoe is made of two pieces, with a flat rivet-nail joining them together at the toe, so that it may be made both wide or narrow, to serve any foot.

7. The patten-shoe; this is used for a horse that is burnt in the hip, stifle or shoulder; as it causes him to bear upon that leg the grief is on, and consequently makes him use it the better.

8. The panton or pantable shoe, which opens the heels, and helps hoof-binding. To which may be added the half panton-shoe, and the shoe proper for flat feet.

**HORSE-SHOE**, in fortification, is a small work sometimes of a round and sometimes of an oval figure, inclosed with a parapet, sometimes raised in the moat or ditch, or in low grounds, and sometimes to cover a gate, or to serve as a lodgment for soldiers.

**HORSE-SHOE-HEAD**, a disease in infants, in which the futures of the skull lie too open.

This is commonly a sign of a weak constitution, and a short life. The nurses usually embrocate the parts affected with brandy or rum, to which some add the white of an egg, or palm-oil.

**HORSE**, in a military sense, the same with cavalry. See the article **CAVALRY**.

The light horse, in an army, are all the regiments of horse, except the guards.

**HORSE**, in a ship, is a rope made fast to each yard arm, and on which the men stand to furl the sails. It is also a wooden frame with a rowel fixed in it, made use of by the riggers to woad ships-masts.

**HORSHAM**, a market-town and borough of Sussex, situated twenty miles north-west of Lewes, in west long. 22', north lat. 51° 10'. It sends two members to parliament.

**HORSHAM-STONE**, a greyish kind of slate, formerly used to cover houses, so called because brought from Horsham.

**HORTAGILERS**, in the grand seignior's court, upholsterers, or tapistery-hangers. The grand seignior has constantly four hundred hortagilers in his retinue when he is in the camp: these go always a day's journey before him, to fix upon a proper place for his tent, which they prepare first; and afterwards those of the officers, according to their rank.

**HORTICULTURE**, the same with gardening. See **GARDEN** and **GARDENING**.

**HORTULANUS**, in ornithology, a bird otherwise called emberiza flava, or the yellow-hammer. See **EMBERIZA** and **YELLOW-HAMMER**.

**HORTUS SICCUS**, a **DRY-GARDEN**, an appellation given to a collection of specimens of plants, carefully dried and preserved.

The value of such a collection is very evident, since a thousand minutæ may be preserved in the well-dried specimens of plants, which the most accurate engraver would have omitted. We shall, therefore, give two methods of drying and preserving an hortus siccus; the first by sir Robert Southwell, in Phil. Trans. n° 227, and the other by Dr. Hill, in his review of the works of the royal society, with the doctor's objections to sir Robert's method.

According to the former gentleman, the plants are to be laid flat between papers, and then put between two smooth plates of iron, screwed together at the corners, and in this condition committed to a baker's oven for two hours. When taken out, they are to be rubbed over with a mixture of equal parts of aquafortis and brandy; and, after this, to be fastened down on paper, with a solution of the quantity of a walnut of gum tragacanth dissolved in a pint of water.

To this the doctor objects, that the heat of an oven is much too uncertain to be employed in so nice an operation; and that the space of time, ordered for the continuing the plants in it, is of no information, unless the degree of heat, and even the different nature of the plant, as to its more or less succulency, and the firmness or tenderness of its fibres, be at-

tended

tended to. There are scarce any two plants perfectly alike in those particulars; and consequently the heat, and duration of heat, that is sufficient for one plant in a parcel, would destroy another. But besides this, he objects farther, that the acid destroys the colour of many plants, never recovers that of others lost in the drying, and frequently, after the plant is fixed down, rots both the paper it is fixed to, and that which falls over it.

As to the doctor's own method, it is as follows: take of a specimen of a plant in flower, and with it one of its bottom leaves, if it have any; bruise the stalk, if too rigid; slit it, if too thick; spread out the leaves and flowers on paper; cover the whole with more paper, and lay a weight over all. At the end of eighteen hours take out the plants, now perfectly flattened; lay them on a bed of dry common sand; sift over them more dry sand, to the depth of two inches, and thus let them lie about three weeks: the less succulent dry much sooner, but they take no harm afterwards. If the floor of a garret be covered, in spring, with sand two inches deep, leaving space for walking to the several parts, it will receive the collection of a whole summer, the covering of sand being sifted over every parcel, as laid in. They need no farther care, from the time of laying them, till they are taken up to be stuck on paper. The cement used by the doctor is thus prepared: early in the spring, put two ounces of camphor into three quarts of water in a large bottle; shake it from time to time; and when the first collected plants are ready for the fastening down, put into a pint of the water, poured off into an earthen vessel that will bear the fire, two ounces of common glue, such as is used by the carpenters, and the same quantity of *ichthyocolla* beat to shreds; let them stand six and thirty hours, then gently boil the whole a few moments, and strain it off through a coarse cloth. This is to be warmed over a gentle heat, when it is to be used, and the back of the plants smeared over thereby with a painter's brush: after this lay them on paper, and gently press them for a few minutes; then expose them to the air a little, and finally lay them under a small weight between quires of paper to be perfectly dried.

It is scarce to be conceived, how strongly the water becomes impregnated with the camphor by this simple process: a part of

it, indeed, flies off in the making of the cement and the using of it; but enough remains with the plant to prevent the breeding of insects in it. He farther observes, that plants may be dried very well without sand, by only putting them frequently into fresh quires of paper, or a few, by only pressing them between the leaves of a book; but the sand method preserves the colour best, and is done with least trouble.

Another method, much better than that of the oven, is the flattening and drying the plant, by passing a common smoothing-iron for linnen, over the papers between which it is laid: but for nice things, the most perfect of all methods is that by a common sand-heat, such as is used for chemical purposes. The cold sand is to be spread smooth on this occasion, the plant laid on it carefully flattened, and a thick bed of sand sifted over: the fire is then to be made, and the whole process carefully watched, till by a very gentle heat the plant be perfectly dried.

The colour of the tenderest herb may be preserved in this manner; and flowers that can be preserved no way else, may be managed perfectly well thus.

**HOSANNA**, a hebrew word, signifying *save now*, or *save we beseech thee*; from the frequent use of which, during the feast of tabernacles, the whole solemnity got the appellation of *hosanna rabba*.

**HOSE**, in commerce. See **STOCKING**.

**HOSEA**, a canonical book of the Old Testament, so called from the prophet of that name, its author, who was the son of Beri, and the first of the lesser prophets. He lived in the kingdom of Samaria, and delivered his prophecies under the reign of Jeroboam II. and his successors, kings of Israel, and under the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. His principal design is to publish the gross idolatries of the people of Israel and Judah, to denounce the divine vengeance against them, and to foretel the captivity in Assyria.

**HOSPITAL**, a place or building properly endowed, or otherwise supported by charitable contributions, for the reception and support of the poor, aged, infirm, sick, or helpless.

A charitable foundation laid thus for the sustenance and relief of the poor, is to continue for ever. Any person seized of an estate in fee, may, by deed inrolled in chancery, erect and found an hospital,

tal, and nominate such heads and governors therein as he shall think fit; and this charitable foundation shall be incorporated, and subject to the inspection and guidance of the heads and visitors nominated by the founder. Likewise such corporations shall have, take, and purchase lands, so as not to exceed 200 l. a year, provided the same be not held of the king; and to make leases, reserving the accustomed yearly rent.

Besides a multitude of alms-houses, or small hospitals, founded in England, particularly in and about London, by private men for the relief of the poor, there are a great many hospitals: the principal whereof are these,

**Royal HOSPITAL** for disabled soldiers, commonly called Chelsea-hospital.

This hospital was founded by king Charles II. carried on by king James II. and finished by king William and queen Mary. The building is very spacious and magnificent; the number of ordinary pensioners is about 500, besides the officers and servants of the house: the out and extraordinary pensioners are very numerous; and these upon occasion do duty in the several garrisons, from whence draughts are made for the army, &c. The pensioners are all provided with cloaths, diet, washing, lodging, firing, and have one day's pay in every week for spending-money. The qualifications required to be admitted of this body, are, that the candidate bring a certificate from his superior officer that he has been maimed and disabled in the service of the crown; or that he has served the crown twenty years, which must be made appear by the muster-rolls. To defray the charges of this hospital, there is a considerable sum paid yearly out of the poundage of the army; besides one day's pay of each officer and common soldier every year, which in time of war amounts to a very considerable sum. For the administration of this hospital, there is a governor, lieutenant-governor, major, treasurer, &c.

**Greenwich-HOSPITAL**, a retreat for seamen, who, by age, wounds, or other accidents, are disabled from service; and for the widows and children of such as are slain in the service.

This in point of magnificence and spaciousness, greatly excels even Chelsea-hospital. A good part of it was built in king Charles II's time. It was much promoted by king William, and finished

under queen Anne, king George I. and II. The number of pensioners entertained in this hospital, are about 1200; and to each hundred are allowed five nurses, being the widows of seamen. The pensioners are all cloathed in blue, and are allowed stockings, shoes, linnen, and twelve-pence a week for other necessaries: the victualling is according to the allowance of Chelsea-hospital, viz. four men to a mess, each mess to contain four pounds of flesh, a gallon of beer, &c. There are 100 boys, the sons of disabled seamen, who are maintained with the money arising by shewing the hospital and painting in the hall.

This hospital is administered by a governor, lieutenant-governor, &c.

**Christ's HOSPITAL**, by Newgate-street, formerly a convent of grey friars, being dissolved by king Henry VIII. was converted by his son Edward VI. into an hospital for poor children, called the blue-coat hospital, from the blue cloathing of the children, whose number amounts to about 900; the greatest part maintained in the house, and the others at nurse, at the charge of the foundation. The boys are yearly put to trades, and the girls to some honest service or trade. Here the boys have a grammar-school, from which the most improved scholars are yearly sent to the university: there is here also a stately writing school, and a mathematical school, founded by king Charles II. where forty youths are taught several parts of the practical mathematics, particularly navigation, to fit them for apprentices to masters of ships.

The officers of this hospital are a president, treasurers, governors, &c.

**St. Bartholomew's HOSPITAL**, at a small distance from Christ's hospital, did formerly belong to the same grey friars, but after the dissolution of the monasteries, king Henry VIII. left 500 marks a year to it for the relief of poor people: but it was much more largely endowed for the use of sick and lame persons only, by Edward VI. There are two other hospitals at the charge of this; one in King'sland, and the other, called the Lock, in Southwark, for the venereal disease only. It is computed that these three hospitals relieve five thousand poor sick and lame persons annually, six or seven hundred of which are in-patients at St. Bartholomew. This hospital is a large, sumptuous, new building of stone, erected with proper offices in the nature of a quad-

quadrangle. It is provided with able physicians and surgeons, &c. For the direction of it there is a president, treasurer, &c.

**Bethlehem, or bedlam HOSPITAL**, a stately hospital in Moorfields, for the cure and maintenance of poor lunatics, or distracted persons. This hospital, for elegance of structure and spacious conveniencies, is not to be equaled in Europe. It stands also in a good open air.

**St. Thomas's HOSPITAL**, in Southwark, is upon the same scheme and nature with St. Bartholomew. It is a noble extensive charity, was founded by king Edward VI. and rebuilt in 1701.

**Guy's HOSPITAL**, near St. Thomas's, was founded at the sole cost of Thomas Guy, bookseller of London, in 1722, who left 200,000*l.* to build, finish, and endow it. It was designed chiefly for incurables.

**Sutton's HOSPITAL**. See CHARTREUSE.

**Bridewell HOSPITAL**. See BRIDEWELL.

At Hoxton there is another hospital, founded by alderman Aske, for twenty poor old men of the haberdasher's company, and twenty poor boys to be there educated.

There are also two very beneficial charities or hospitals, one at Hyde-park-corner, and the other in Petty-france, Westminster, after the manner of those in London, and both very well attended.

In 1739, a long wished-for charity was established by charter for taking in and educating poor deserted young infants. The governors and guardians have purchased of the earl of Salisbury fifty acres of land in Lamb's conduit-fields, on which they have erected a large building for this charitable purpose, called the founding hospital.

About the year 1741, an infirmary or hospital in Goodman's fields was begun by charitable donations, for the relief of disabled poor seamen in the merchant service; and now they are near finishing a large stately building for this charitable undertaking near White-chapel-mount.

For several other charities of a like nature, tho' less considerable, in and about London, see the article WORKHOUSE.

**Camp-HOSPITALS**, are either general or regimental. The general hospitals are of two kinds, *viz.* the flying hospital, attending the camp at some convenient distance, and the stationary hospital, which is fixed at one place. In the choice

of both Dr. Pringle thinks it better to have them in towns than villages, as the former will afford larger wards, besides more of other conveniencies. These wards should be as airy as possible. Regimental hospitals are of the greatest importance, and therefore should be supplied with blankets and medicines from the public stores, with an allowance also for nurses and other necessaries. Barns, stables, granaries, and other out-houses, but above all churches, make the best hospitals from the beginning of June to October.

**HOSPITAL-FEVER**, a name given to the malignant catarrhal fever, as being frequent in hospitals. See the article MALIGNANT FEVER.

This sort of fever, according to Dr. Pringle, may be owing to a great many concurring causes, but the principal are foul and putrid air, occasioned by filth and impurity of any kind. Hence it is no wonder that it prevails in marshy countries, after hot seasons, and in populous cities, especially if low and ill aired, unprovided with common shores; or where the streets are narrow and foul, and the houses dirty; water scarce; and when jails and hospitals are crowded, and not ventilated, and kept clean; when in sickly times the burials are within the towns, and the bodies not laid deep; when slaughter-houses are also within the walls, or when dead animals or offals are left to rot in kennels, or on dunghills; when drains are not provided to carry off any large quantity of stagnating and corrupted water in the neighbourhood; when flesh meat make the greatest part of the diet, without a proper mixture of bread, greens, wine, or other fermented liquors; from the use of old musty grain, or what has been damaged by a wet season; or, lastly, when the fibres are relaxed by immoderate warm bathing.

When the disease comes on slowly, the symptoms are small interchanges of heats and colds, trembling of the hands, interrupted sleep, &c. but when it advances fast, the above symptoms are in a higher degree; and besides these, the patient is afflicted with a great lassitude, a nausea, pains in the back, a constant pain and confusion in the head, a dejection of spirits, &c. The method of cure varies according to the state of the disease, which may be distinguished into three periods: the first continuing as long as the

the person is able to go about ; the second beginning with his confinement ; and the third, when the pulse sinks, and the stupor comes on.

In the first as well as the other period, the cure is principally to be aimed at by removing the patient out of the foul air. When this cannot be done, the ward or room should be purified by making a succession of air by means of fires, or letting it in by doors and windows, or diffusing the steams of vinegar. The next thing to be done is to promote a diaphoresis, which in this period should only be attempted by mild sudorifics, as the *spiritus mindereri*.

When the fever is confirmed, contrayerva powders, with nitre, camphor, the common ptisan acidulated, and such medicines as are good in inflammatory cases, ought to be given. Costiveness is prevented by emollient clysters. But opiates are dangerous both in this and the third stage, in which the pulse sinks, and stupor is greater, a delirium impends, and the petechiæ often appear. When this is observed to be the case, the nitre and diaphoretic medicines are to make room for a decoction of snake-root, to which a small quantity of strong water may be added. It may also be given in substance from two to four scruples a day, with sensible good effects. Towards the decline of the fever, an equal quantity of peruvian bark may be joined with the root. Wine is also an excellent cordial at this period, and may be given either made into whey, or added to the panado ; being the only food proper for the patient. It may be taken from half a pint to a quart a day, according to the strength of the patient. Perhaps there is no rule of more importance than to give a strict charge to the attendants of the sick never to let the patient, when low, remain above two or three hours without taking something cordial and nourishing. If there be danger of a phrenitis coming on, it will be proper to call in the assistance of epispastics. Sinapisms too may be useful when the pulse is very much sunk. If a diarrhoea comes on in the decline of the fever, it is to be moderated by adding a few drops of the *tinctura thebaica*, to the full quantity of the alexipharmic decoction ; or by giving a spoonful or two of an astringent mixture. In proportion, however, to the putrid nature of the stools, astringents are to be used with the greatest

caution. When the fever is over, there are few but complain of a vertigo and want of rest ; a continuation of the deafness and other nervous symptoms, are frequently the consequence of great lowness, in which case the *pilulæ Mathæi* are to be given at night, with analeptics, and medicines of the strengthening kind.

**HOSPITALERS**, an order of religious knights, now known by the title of knights of Malta. See **MALTA**.

**HOSPITIUM**, a term used in old writers either for an inn or a monastery, built for the reception of strangers and travellers. See **INN** and **MONASTERY**.

**HOSPODAR**, a title borne by the princes of Walachia and Moldavia, who receive the investiture of their principalities from the grand seignior. He gives them a vest and standard : they are under his protection, and obliged to serve him, and he even sometimes deposes them ; but in other respects they are absolute sovereigns within their own dominions.

**HOST**, *hospes*, denotes either a person who entertains another, or the person so entertained ; but it is now generally used in the first of these senses.

**HOST**, or **HOAST**, *hostia*, in the church of Rome, a name given to the elements used in the eucharist, or rather to the consecrated wafer ; which they pretend to offer up every day, a new host or sacrifice, for the sins of mankind.

They pay adoration to the host, upon a false presumption, that the elements are no longer bread and wine, but transubstantiated into the real body and blood of Christ. See **TRANSUBSTANTIATION**.

**HOSTAGE**, a person given up to an enemy as a security for the performance of the articles of a treaty.

When two enemies enter into a treaty or capitulation, it is common for them mutually to give hostages as a security for their reciprocally performing the engagements they have entered into. An hostage becomes either an accessory or principal, according to the state of things. Thus, for example, he is an accessory, when a prince promises fidelity to another prince, and gives either his son, or some great lord, as a security for his performing his promise without any farther stipulation : for then these hostages are only an additional engagement of the prince ; and if he violate his word, they are not in any manner responsible for it. An hostage becomes a principal, when it is stipulated

stipulated that he shall be answerable for the event of things. For example, if a city promises to surrender within a certain time, in case it is not succoured, and for the security of this article gives hostages, these hostages are of the same nature as bail given to a creditor to secure a debt; so that if the succour arrives within the time, the promise becoming void, the hostages are discharged, and cannot be detained, just as the bail is discharged, if the original debtor pays the creditor; but if the succours do not arrive, and the city is guilty of a breach of faith, by refusing to surrender, then the hostages become principal, and may be punished for the breach of faith; just as a bail becomes the principal debtor, on the other debtor's becoming insolvent.

An hostage given for another person is free, in case that other person dies. According to the law of nations, hostages ought not to be put to death, unless they themselves have been guilty of some particular crime.

**HOSTEL**, or **HOTEL**. See **HOTEL**.

**HOSTIA**, **HOST**. See the article **HOST**.

**HOSTILITY**, denotes a state of war or enmity between two nations.

During a truce, all acts of hostility are to cease on both sides.

**HOT**, a relative term, importing the contrary of cold. See **HEAT** and **COLD**.

**HOT-BATH**. See the article **BATH**.

**HOT-BEDS**, in gardening, beds made with fresh horse-dung, or tanner's bark, and covered with glasses to defend them from cold winds.

By the skilful management of hot-beds, we may imitate the temperature of warmer climates; by which means, the seeds of plants brought from any of the countries within the torrid zone, may be made to flourish even under the poles.

The hot-beds commonly used in kitchen-gardens, are made with new horse-dung mixed with the litter of a stable, and a few sea-coal-ashes, which last are of service in continuing the heat of the dung. This should remain six or seven days in a heap, and being then turned over, and the parts mixed well together, it should be again cast into a heap, where it may continue five or six days longer, by which time it will have acquired a due heat. These hot-beds are made in the following manner: in some sheltered part of the garden, dig out a trench of a length, and width proportionable to the frames you intend it for; and if the ground be

dry, about a foot or a foot and a half deep; but if it be wet, not above six inches: then wheel the dung into the opening, observing to stir every part of it with a fork, and to lay it exactly even and smooth on every part of the bed, laying the bottom part of the heap, which is commonly free from litter, upon the surface of the bed: and if it be designed for a bed to plant out cucumbers to remain for good, you must make a hole in the middle of the place designed for each light about ten inches over, and six deep, which should be filled with good fresh earth, thrusting in a stick to shew the places where the holes are; then cover the bed all over with the earth that was taken out of the trench, about four inches thick, and put on the frame, letting it remain till the earth be warm, which commonly happens in three or four days after the bed is made, and then the plants may be placed in it. But if your hot-bed be designed for other plants, there need be no holes made in the dung; but after having smoothed the surface with a spade, you should cover the dung about three or four inches thick with good earth, putting on the frames and glasses, as before. In making these beds, care must be taken to settle the dung close with a fork; and if it be pretty full of long litter, it should be trod down equally on every part. During the first week or ten days after the bed is made, you should cover the glasses but slightly in the night, and in the day time carefully raise them, to let out the steam; but as the heat abates, the covering should be increased, and as the bed grows cold, new hot dung should be added round the sides of it.

The hot-bed made with tanner's bark, is, however, much preferable to that described above, especially for all tender exotic plants and fruits, which require an even degree of warmth to be continued for several months, which cannot be effected with horse-dung. The manner of making them is as follows: dig a trench about three feet deep, if the ground be dry; but if wet, it must not be above a foot deep at most, and must be raised two feet above the ground. The length must be proportioned to the frames intended to cover it, but it should never be less than ten or twelve feet, and the width not less than six. The trench should be bricked up round the sides to the above-mentioned height of three feet, and filled in the spring with fresh tanner's bark

that has been lately drawn out of their wats, and has lain in a round heap, for the moisture to drain out of it, only three or four days; as it is put in, gently beat it down equally with a dung-fork; but it must not be trodden, which would prevent its heating, by settling it too close: then put on the frame, covering it with glasses; and in about ten days or a fortnight, it will begin to heat; at which time, plunge your pots of plants or seeds into it, observing not to tread down the bark in doing it. These beds will continue three or four months in a good temper of heat; and if you stir up the bark pretty deep, and mix a load or two of fresh bark with the old when you find the warmth decline, you will preserve its heat two or three months longer. Many lay some hot horse-dung in the bottom of the trench under the bark; but this ought never to be practised unless the bed is wanted sooner than the bark would heat of itself, and even then there ought only to be a small quantity of dung at the bottom.

The frames which cover these beds, should be proportioned to the several plants they are designed to contain; if they are to cover the bananas or pineapple, the back part should be three feet high, and the lower part fifteen inches: if the bed be intended for taller plants, the frame must be made of a depth proportionable to them; but if it be for sowing of seeds, the frame need not be above fourteen inches high at the back, and seven in the front; by which means, the heat will be much greater.

**HOT-HOUSE**, in salt-making, the place where they dry the salt, when taken out of the boiling-pan: it is situated near the furnace, which, by means of funnels or tubes, conveys the heat into it.

**HOTCH-POT**, in law, is used for mixing of lands given in marriage with other lands in fee which fall by descent; as where a man possessed of thirty acres of land has issue only two daughters, and after his having given with one of them ten acres in marriage, he dies possessed of the other twenty: here she that is thus married, in order to gain her share of the rest of the land, must put her part given in marriage in hotch-pot; that is, she must refuse to take the sole profits of her lands, and cause it to be mingled with the other, so that an equal division may be made of the whole between her

and her sister; by which means, instead of only her ten acres, she has fifteen.

**HOTTENTOT-COUNTRY**, the most southern promontory of Africa, comprehending the cape of Good Hope, and the rest of the dutch settlements, situated between 15 and 35° of east long. and between 23 and 35° of south lat. Though mountainous, it is a most fruitful country. The hottentot-nations who inhabit the southern promontory, are sixteen in number; and as the natives are extremely useful to the Dutch, they suffer them to be governed by their own laws and customs. They are black, and in their flat noses, thick lips, and hair, resemble the negroes. It is remarkable, that all the women have a callous flap or skin which hangs over the pudenda.

**HOTTONIA, WATER-VIOLET**, in botany, a genus of the *pentandria-monogynia* class of plants, the flower of which consists of a single petal, the tube whereof is equal in length to the cup, and its limb plain, and divided into five ovate-oblong, emarginated segments: the fruit is a globose acuminate capsule, placed on the cup, and having only one cell, in which are contained a great number of round seeds.

**HOTTS, or HUTTS**, are the pounces and round balls of leather, stuffed; and tied to the spurs of fighting-cocks, to keep them from hurting one another in sparring.

**HOUDEN**, a market-town in the east riding of Yorkshire, fourteen miles south-east of York.

**HOUGH and HOUGHING**, in agriculture. See **HOE** and **HOEING**.

**HOUGH**, in the manege, is that joint of the hinder quarter which joins the thigh to the leg.

**HOVINGHAM**, a market-town of the east riding of Yorkshire, seventeen miles north-east of York.

**HOULSWORTHY**, a market-town of Devonshire, thirty-eight miles north-west of Exeter.

**HOUND**, a hunting dog, of which there are several sorts, as the grey-hound, gaze-hound, &c.

The grey-hound is valued for his swiftness, strength, and sagacity in pursuing the game. Those of the best sort have a long body, a sharp head, sparkling eyes, a long mouth, and sharp teeth; little ears with thin gristles, a straight, broad, and strong breast; his legs long, and his belly small; with broad shoulders,



ders, round ribs, fleshy buttocks, but not fat, and a long tail.

The best time to try and train greyhounds to the game, is at twelve-months old; they should be kept in a slip white abroad, till they can see their course, and a young dog should not be run till the game has been a considerable time on foot, lest being over-greedy of the prey, he strain his limbs. The huntsman is to lead them on his left hand, if he be on foot, and on the right if on horseback. For the method of entring greyhounds, see the article *ENTRANCE of hounds*.

The greyhound ought to be coursed three times a week, and rewarded with blood, which will encourage him to prosecute his game; but forget not to give the hare all the just advantage, that the greyhound may shew his utmost strength and skill before he reap the benefit of his labour. If he kill, take the hare from him, and cleaning his chops from the hare's wool, give him the liver and lights; then taking him up in your leath, lead him home, wash his feet with butter and beer, put him into his kennel, and half an hour after, feed him. Upon the couring days give him a toast and butter, or oil, in the morning, and nothing else, and then kennel him till he go to the course.

In the breeding of grey-hounds it should be observed, that the best dog upon an indifferent bitch will not get so good a whelp as an indifferent dog upon the best bitch: that the dogs and bitches ought as near as possible to be of an equal age, and not to exceed four years old; however, excellent whelps are frequently produced by breeding with a young dog and an old bitch.

The general food of a grey-hound ought to be chippings, crusts of bread, soft bones and gristles; the chippings should be scalded in beef, mutton, veal, or venison broth, and when it is pretty cool, made to float in good milk, and if this be given him morning and evening, it will keep him in a good state of body. But if he be poor, sickly and weak, take a sheep's head with the wool, break it to pieces, and boil it till it is very tender, and thickening the broth with oatmeal, feed your dog with the meat and broth morning and evening. If you design your grey-hound for a wager, give him the following diet-bread. Take half a peck of wheat-flour, and the same quantity of oatmeal, and having scattered in it an indifferent quantity of liquorice and

anniseeds, knead it up with the whites of eggs, and bake it in small loaves, then soak it in beef or other broths, and having walked and aired him, half an hour after sun-rise, and half an hour after sun-set, give him some of it to eat.

*Blood-HOUND*, is a dog remarkable for the keenness of his scent: he differs from the scotch sluck-hound, only in the largeness of his size, and in his not being always of the same colour; for these hounds are sometimes red, fanded, black, white, spotted, and of all the colours of the other hounds. Those who have a square and flat nose always pointed to the earth, are generally thought to have the best scent; they should likewise have a small head, brisk eyes, long ears hanging down, his legs of an equal length, his breast not deeper than his belly, and his tail nimble.

The blood-hound seldom barks, except in the chase; and on being set on by the voice of the huntsman, seeks about for the game, and not only keeps to it while it is living, but if it be by any accident killed or wounded, will find it out by the scent of the blood sprinkled on the ground.

*Gaze-Hound*. See *GAZE-Hound*.

*HOURL*, *bora*, in chronology, an aliquot part of a natural day, usually a 24th, sometimes a 12th.

But the word hour has not always been of the same signification; for in antient times an hour did indefinitely express a short space of time. It is thought too that antiently the four seasons of the year, wherein the sun finisheth its annual course, had the name of hours, because Horus instituted a certain year, consisting of three months, and for this reason the antients called spring, summer, autumn, and winter, hours, and the year itself horus: of which some footsteps appear in this, that the Greeks called their annals *Hori*; and the writers of them, *horographi*. However it be, the division of the day into hours is very antient, tho' the most antient hour is that of the twelfth part of the day.

An hour, with us, is a measure or quantity of time, equal to a 24th part of the natural day, or nychthemeron; or it is the duration of the 24th part of the earth's diurnal rotation. Fifteen degrees of the equator answer to an hour; tho' not precisely, yet near enough for common use.

The hour is divided into sixty minutes ; the minute into sixty seconds ; the second into sixty thirds, &c.

To find the hour of the day, the latitude of the place, the sun's declination, and his altitude must be given. Thus, Suppose the latitude is  $51^{\circ} 32'$ , the sun's declination  $18^{\circ}$  north, and his altitude  $40^{\circ}$ , to find the hour of the day.

The geometrical solution of this problem is performed by projecting stereographically on the plane of the meridian the oblique angled spherical triangle which is made by the complement of the latitude ; the complement of the sun's altitude, and the sun's distance from the elevated pole. Thus, with the chord of  $60^{\circ}$  (plate CXXXIV. fig. 1.) draw the primitive circle ZONH ; quarter it ; also draw the axis PCP thro' the poles, and the equinoctial  $\text{ECQ}$ , likewise the parallel of declination D  $\odot$  d equal  $18^{\circ}$  ; then draw parallel to the horizon HQ, the almazcancer or parallel of the sun's altitude  $= 40^{\circ}$  to cut the parallel of the sun's declination in  $\odot$  the place of the sun at that time. Then through  $\odot$  draw two great circles, one through Z and N the poles of the horizon, and the other thro' P and P the poles of the equinoctial, as Z  $\odot$  N, and P  $\odot$  P ; which form the oblique angled spherical triangle PZ  $\odot$

and the angle ZP  $\odot$  measured on the line of half tangents gives the hour of the day from twelve, viz.  $47^{\circ} 20'$  equal to 3 hours 9 minutes nearly, or to 51 minutes after eight in the morning, or 51 minutes before four in the afternoon. But by spherical trigonometry, having three sides given ; that is ZP  $38^{\circ} 28'$  the complement of the latitude, Z  $\odot$   $50^{\circ} 00'$  the complement of the sun's altitude, and P  $\odot$   $72^{\circ} 00'$  the sun's distance from the elevated pole (which is the declination added to  $90^{\circ}$ , when the latitude and declination are of a contrary name ; but if of one name, it is the complement of the declination) : and the angle ZP  $\odot$  the hour of the day is found by case 11. of spherical trigonometry, as follows. First add the complement of the latitude, complement of the sun's altitude, and the sun's distance from the elevated pole, into one sum. Secondly, From half that sum subtract the complement of the sun's altitude, noting the half sum, and the remainder. Then the complement arithmetical of the sines of the complement of the latitude, and the sun's distance from the pole, and the sines of the said half sum and remainder, added together ; the sine of half this sum, doubled, and subtracted from 180 degrees, gives the hour from noon.

Side	$\left\{ \begin{array}{l} \text{ZP Co. lat. } 38^{\circ} 28' \\ \odot \text{P Co. decl. } 72^{\circ} 00' \\ \text{Z } \odot \text{ Co. alt. } 50^{\circ} 00' \end{array} \right\}$	containing sides	$\left\{ \begin{array}{l} \text{S. co. ar. } - 0.206168 \\ \text{S. co. ar. } - 0.021794 \\ \text{S. } - 9.993660 \end{array} \right\}$
	Sum is, $160^{\circ} 28'$		half sum sides, $80^{\circ} 14'$ S. $- 9.993660$
	Half is, $80^{\circ} 14'$		remainder $30^{\circ} 14'$ S. $- 9.702019$
	Co. alt. $50^{\circ} 00'$		sum of the 4. $- 19.923641$
Remainder	$30^{\circ} 14'$		fine half sum $\left\{ \begin{array}{l} - 9.961820 \\ 66^{\circ} 20' \\ 66^{\circ} 20' \end{array} \right\}$

Which doubled gives  $132^{\circ} 40'$

This subtracted from  $180^{\circ} 00'$  leaves  $47^{\circ} 20'$  equal to 3 hours 9' nearly, the same as before.

By the same operation you may find the sun's azimuth PZ  $\odot$ , if instead of the complement of the sun's altitude you subtract the sun's distance from the pole, noting the half sum and remainder as before. And the rule will stand thus : To the complement arithmetical of the sines of the complement of the latitude, and complement of the sun's altitude, add the sines of the aforefaid half sum and remainder : then the sine of half the total of these four, doubled, and taken from 180 degrees, gives the sun's azimuth

from the north, in north latitude ; and from the south, in south latitude.

If the hour of the night is required, the height of some star must be taken. And it is found by adding to, or subtracting the right ascension of that star from that of the sun.

There are divers kinds of hours, used by chronologers, astronomers, dialists, &c. Sometimes hours are divided into equal and unequal. Equal hours are the 24th part of a day and night precisely, that is, the time wherein fifteen degrees of the equator mount above the horizon. These are also called equinoctial hours, because they are measured on the equinoctial ;

noſtial ; and astronomical, becauſe uſed by aſtronomers. They are alſo differently denominated, according to the manner of accounting them in different countries. Aſtronomical hours are equal hours, reckoned from noon, or mid-day, in a continued ſeries of twenty-four. Babyloniſh hours are equal hours reckoned in the ſame manner from ſun-riſe. The Italian hours, are alſo equal hours reckoned in the ſame manner too, from ſun ſetting. European hours are alſo equal hours, reckoned from midnight ; twelve from thence to noon, and twelve more from noon to midnight. Jewiſh, or planetary, or antient hours, are the twelfth part of the artificial day and night, each being divided into twelve equal parts. Hence, as it is only in the time of the equinoxes that the artificial day is equal to the night, it is then only that the hours of the day are equal to thoſe of the night : At other times they will be always either increaſing or decreaſing. And they will be the more or leſs unequal according to the obliquity of the ſphere.

**HOUSE**, *domus*, a habitation, or place built with conveniencies for dwelling in : thus, we ſay a town-houſe, country-houſe, &c.

A country-houſe is the villa of the antient Romans, the quinta of the Spaniards and Portugueſe, the cloſerie and caſſine of the French, and the vigna of the Italians.

It ought always to have wood and water near it ; theſe being the principal beauties of a rural ſeat. The trees make a far better defence than hills, as they yield a cooling, and healthy air, ſhade during the heat of ſummer, and very much break the ſeverities of the winter-ſeaſon.

It ſhould not be ſituated too low, on account of the moiſture of the air ; and, on the other hand, thoſe built on places expoſed to the winds are expensive to keep in repair. In houſes not above two ſtories high, and upon a good foundation, the length of two bricks, or eighteen inches, for the heading courſe will be ſufficient for the ground-work of any common ſtructure ; and ſix or ſeven courſes above the earth, to a water-table, where the thickneſs of the walls are abated, or taken in, on either ſide the thickneſs of a brick, *viz.* two inches and a quarter. But for large and high houſes of three, four, or five ſtories,

with garrets, their walls ought to be three heading courſes of bricks, or twenty-eight inches at leaſt, from the foundation to the firſt water-table ; and at every ſtory a water-table, or taking in, on the inſide, for the ſummers, girders, and joists to reſt upon, laid into the middle, or one quarter of the wall at leaſt, for the better bond. But as for the partition wall, a brick and half will be ſufficiently thick ; and for the upper ſtories, a brick length, or nine inch brick wall will ſuffice.

As to the regulations concerning the houſes in London, we have taken notice of them under the article **BUILDING**.

**Town-HOUSE**, a public hall, where the magiſtrates of a town, or borough, hold their meetings for the due adminiſtration of their polity.

**Work-HOUSE**, a place built at the charge of a county, town, or pariſh, where indigent, vagrant, and idle people, as alſo ſtrumpets, gameſters, and other rogues, are ſet to work, and furniſhed with clothing, diet, &c. Such are the London work-houſe, Bridewell, and that of the pariſh of St. Margaret, Weſtmiſter.

The juſtices, at their ſeſſions, are required to appoint governors, or maſters of ſuch houſes, whoſe office is to ſet the perſons committed to their charge to work, and to give them moderate correction by whipping, &c. if refractory ; and to render a true account every quarter ſeſſions, of perſons committed into their cuſtodies.

**HOUSE-BOTE**, in law, an allowance of timber out of the lord's woods, for the repairs of an houſe : this is otherwiſe called *estovers*.

**HOUSE** is alſo uſed for a noble family, or race of illuſtrious perſons, deſcended from the ſame ſtock.

**HOUSE**, in aſtrology, denotes the twelfth part of the heavens.

The diviſion of the heavens into houſes, is founded upon the pretended influence of the ſtars, when meeting in them, on all ſublunary bodies. Theſe influences are ſuppoſed to be good or bad, and to each of theſe houſes particular virtues are aſſigned, on which aſtrologers prepare and form a judgment of their horoſcopes. The horizon and meridian are two circles of the celeſtial houſes, which divide the heavens into four equal parts, each containing three houſes ; ſix of which are above the horizon, and ſix below

below it : and six of these are called eastern, and six western houses.

A scheme, or figure of the heavens is composed of twelve triangles, also called houses, in which is marked the stars, signs and planets so included in each of these circles. Every planet has likewise two particular houses, in which it is pretended, that they exert their influence in the strongest manner ; but the sun and moon have each of them only one, the house of the former being Leo, and that of the latter Cancer.

The houses in astrology have also names given them according to their qualities ; the first is the house of life ; this is the ascendant, which extends five degrees above the horizon, and the rest below it : the second is the house of riches : the third the house of brothers : the fourth, in the lowest part of the heavens, is the house of relations, and the angle of the earth : the fifth, the house of children : the sixth, the house of health : the seventh, the house of marriage, and the angle of the west : the eighth, the house of death : the ninth, the house of piety : the tenth the house of offices : the eleventh, the house of friends : and the twelfth, the house of enemies.

**HOUSE-BREAKING, or ROBBERING**, is the breaking into and robbing a house in the day-time, the same crime being termed burglary, when done by night ; both are felony, without benefit of clergy.

**HOUSE of Lords.** } See **PARLIAMENT**.

**HOUSE of Commons.** }  
**Green-HOUSE.** See the article **GREEN**.

**HOT-HOUSE.** See the article **HOT**.

**HOUSE-PAINTER.** See **PAINTER**.

**HOUSE-LEEK**, *sedum*, in botany. See the article **SEDUM**.

**HOUSEHOLD**, the whole of a family considered collectively, including the mistress, children, and servants. But the household of a sovereign prince includes only the officers and domestics belonging to his palace.

The principal officers of his majesty's household are, the lord steward, lord chamberlain of the household, the groom of the stole, the master of the great wardrobe, and the master of the horse.

The civil government of the king's house is under the care of the lord steward of the king's household, who, as he is the chief officer, all his commands are observed and obeyed. His authority extends over all the other officers and servants, except those of his majesty's

chapel, chamber, and stable, and he is the judge of all crimes committed either within the court or the verge. See the articles **LORD STEWARD** and **VERGE**.

Under him are the treasurer of the household, the comptroller, cofferer, the master of the household, the clerks of the green-cloth, and the officers and servants belonging to the accounting-house, the marshal, the verge, the king's kitchen, the household kitchen, the acatery, bake-house, pantry, buttery, cellar, pastry, &c. Next to the lord steward is the lord chamberlain of the household, who has under him the vice chamberlain, the treasurer, and comptroller of the chamber ; forty-eight gentlemen of the privy chamber, twelve of whom wait quarterly, and two of them lie every night in the privy-chamber ; the gentleman usher, the grooms of the great chamber, the pages of the presence-chamber ; the mace-bearers, cup-bearers, carvers, musicians, &c. See **LORD CHAMBERLAIN of the Household**.

The groom of the stole has under him the eleven other lords of the bed-chamber, who wait weekly in the bed-chamber, and by turns lie there a nights on a pallet-bed ; and also the grooms of the bed chamber, the pages of the bed-chamber and back stairs, &c. See **Groom of the STOLE**.

The master or keeper of the great wardrobe has under him, a deputy, comptroller, clerk of the robes, brusher, &c. and a number of tradesmen and artificers, who are all sworn servants to the king.

The master of the horse has under his command the equeries, pages, footmen, grooms, coachmen, farriers, sadlers, and all the other officers and tradesmen employed in his majesty's stables.

Next to the civil list of the king's court, is the military, consisting of the band of gentlemen pensioners, the yeomen of the guard, and the troops of the household : of which, the two first guard the king above stairs.

When the king dines in public, he is waited upon at table by his majesty's cup-bearers, carvers, and gentlemen sewers ; the musicians playing all the time. The dinner is brought up by the yeomen of the guard, and the gentlemen sewers set the dishes in order. The carvers cut for the king, and the cup-bearers serve him the drink with one knee on the ground, after he has first tasted it in the cover.

**HOUSING**, among bricklayers, a term used

used for a tile or brick that is warped, or cast crooked or hollow in burning.

Tiles are apt to be housing or hollow on the struck side, or that which was uppermost in the mould, and bricks on the contrary side.

**HOUSING**, or **HOUZING**, in the manege, is either boot or shoe-housing: the former is a piece of stuff made fast to the hinder part of the saddle, and covers the croupe of the horse, either for ornament, or to cover the horse's leannels, or to preserve the rider's cloaths from being dabbled with the sweat, &c. of the horse.

The housing, for such as ride with shoes, is commonly a piece of scarlet cloth embroidered with gold fringe, and put round the saddle so as to cover the croupe, and descend to the lower part of the belly, to save the gentleman's silk stockings when he mounts in his shoes.

**HOUSTONIA**, in botany, a genus of the *tetrandria-monogynia* class of plants, the corolla of which consists of a single petal, of a funnel-shape, with a patent limb divided into four roundish segments; the fruit is a roundish, didymous, bivalve capsule, with two cells, each containing a single seed.

**HOW**, or **HOB**. See the article **HOB**.

**HOWKER**, or **HOOKER**. See **HOOKER**.

**HOWLE**, among ship-carpenters, is said of a ship whose futtocks are scuffed and bolted into the ground timbers, and the plank laid on them to the orlop.

**HOY**, in naval architecture, a small vessel, fitted only with one mast. See **SHIP**.

**HOYE**, a town of Westphalia, capital of a county of the same name, and subject to the elector of Hanover; east long. 9°, north lat. 53° 5'.

**HOYSE**, or **HOISE**, in the sea-language. See the article **HOISE**.

**HOZING** of dogs, the same with expediting. See the article **EXPEDITE**.

**HUBERT**, or **St. HUBERT**, a town of the dutchy of Luxemburg, thirty miles south-east of Namur.

**HUCKSTER**, a person who sells provisions, or small wares, by retail.

**HUDSON'S BAY**, a large mediterranean sea of north America, situated between 51° and 63° of north lat. and of unequal breadth from 130 to 35 leagues.

**HUDSON'S STREIGHTS**, giving entrance into Hudson's Bay, lie between 65° and 75° of west long.

**HUDSON'S RIVER**, rises near the lake Champlain, in Canada, and falls into the Atlantic, a little below the city of New-York.

**HUDSON'S BAY Company**. See the article **COMPANY**.

**HUE AND CRY**, in law, the pursuit of a person who has committed felony on the highway.

If the party robbed, or any in the company of a person either robbed or murdered, go to the constable of the next town, and require him to raise hue and cry, and to pursue the offender, describing him; and giving an account as near as he can, of the course he steered; the constable is immediately to call upon the parish for aid in seeking after the felon, and if he cannot be found within the bounds of that parish, then he is to give the next constable warning, and he the next, till the offender be apprehended, or at least pursued to the sea-side. If persons are not ready at the summons of the sheriff, and cry of the county to engage in the pursuit, they may be fined: and in case the inhabitants of any hundred, after hue and cry is made, neglect to pursue the same, they shall be liable to pay one half of the damages recoverable against the hundred in which the robbery was committed.

In making the hue and cry, diligent search is to be made in all suspected places, and not only parish officers, but all private persons that pursue the hue and cry may arrest the bodies of such persons, as in their pursuit they shall find any ways suspicious, and carry them before a justice of the peace of the county where taken, and in that case, the arresting a person, tho' he should not be guilty, is lawful. 13 Edw. I. If the offender is not taken within forty days after the robbery is committed, the party robbed may make oath before a justice of the peace of the county where the robbery was committed, of the time and place of the robbery, and of what money he was robbed, and that he did not know any of the robbers; and afterwards, within twenty days such person may bring his action against the hundred, which must be sued out within a year after the robbery. 27 Eliz. By a late statute, notice of the robbery is to be inserted in the Gazette, describing the robber and robbery, &c. and process against the hundred, is not to be served on any inhabitant, except the high constable; who is to appear thereto, and to defend the action, &c. 8 Geo. II. c. 16.

**HUEGLY**, a large town in the East Indies, situated on an island in the most westerly branch

branch of the river Ganges, in the province of Bengal : east long.  $87^{\circ}$  north lat.  $23^{\circ}$ .

**HUER**, or **CONDER**, in the herring fishery. See **CONDER** and **FISHERY**.

**HUETTE**, a city of Spain, in the province of New Castile, sixty-seven miles east of Madrid : west long.  $2^{\circ} 45'$ , north lat.  $40^{\circ} 35'$ .

**HUGONIA**, in botany, a genus of the *decandria-pentagynia* class of plants, the corolla of which consists of five large, roundish, and patent petals : the fruit is a globose berry, containing only one hard and striated seed.

The hugonia, a shrub of eight or ten feet high, is a native of the East-Indies.

**HUGUENOTS**, a name given by way of contempt to the Calvinists of France.

The name had its rise in the year 1560 ; but authors are not agreed as to its origin. The most plausible opinion, however, is that of Palquier, who observes, that at Tours, the place where they were first thus denominated, the people had a notion, that an apparition or hobgoblin, called king Hugon, strolled about the streets in the night-time ; from whence as those of the reformed religion met chiefly in the night to pray, &c. they called them huguenots, that is, the disciples of king Hugon.

**HUISSIER**, a serjeant, usher, or beadle. See **SERJEANT**, **USHER**, &c.

**HULKS**, large vessels used in setting the masts of ships. See **SHIP**.

**MULL**, in the sea language, is the main body of a ship, without either masts, yards, sails, or rigging. Thus to strike a hull in a storm is to take in her sails, and to lash the helm on the lee-side of the ship ; and to hull, or lie a hull, is said of a ship whose sails are thus taken in, and helm lashed-a-lee.

**HULL**, in geography, a strong sea-port town in the east riding of Yorkshire, situated on the river Hull, near the mouth of the Humber, thirty-two miles south-east of York.

It is a place of good trade, and has a yard for building men of war and other vessels.

**HULLOCK** of a sail, is a small part of a sail, let loose in a great storm ; it is chiefly used in the mizen to keep the ship's head to the sea, when all the rest of the sail is made up, except a little at the mizen-yard-arm.

**HULPEN**, a town of the Austrian Netherlands, in the province of Brabant,

situated nine miles south-east of Brussels : east long.  $4^{\circ} 22'$ , north lat.  $50^{\circ} 42'$ .

**HULST**, the capital of the county of Woos, in dutch Flanders, situated fifteen miles north-east of Ghent : east long.  $3^{\circ} 50'$ , north lat.  $51^{\circ} 20'$ .

**HUMAN**, in general, is an appellation given to whatever relates to mankind : thus we say, the human soul, human body, human laws, &c. See the articles **SOUL**, **BODY**, &c.

In order to form a just idea of the human body, says Dr. Mead, it ought to be considered as an hydraulic machine contrived with the most exquisite art, in which there are numberless tubes, properly adjusted and disposed, for the conveyance of fluids of different kinds, as the blood, animal spirits, lymph, &c. See the articles **BLOOD**, **SPIRITS**, &c. The solids likewise make a very necessary part of the human body ; some, as the bones, serving as supports and levers to regulate its motions ; others, as the intestines and blood-vessels, serving to prepare and convey nourishment to its various parts ; and, finally, others, as the muscles, acting under the direction of the mind like so many ropes and pulleys. See the articles **BONE**, **INTESTINES**, **VEIN**, **ARTERY**, **MUSCLE**, &c.

As therefore health consists in regular motions of the fluids, together with a proper state of the solids, it is next to a miracle that so complicated a machine should hold out to extreme old age : for a body, such as ours, cannot possibly retain life for ever ; which is not difficult to account for, because the membranous fibres of the blood-vessels, which were made elastic in order to drive their included juices forward, become gradually harder, and at length rigid ; whence they are rendered incapable of executing their offices, and the secretions of the several parts are diminished by degrees : and that this is the case, appears from dissections of the bodies of very old people ; the insides of their arteries being sometimes found ossified here and there, whereby they had almost entirely lost their springiness ; and the orifices of the natural ducts, are often observed to be quite cartilaginous.

**HUMANITY**, the peculiar nature of man, whereby he is distinguished from all other beings. See the article **MAN**.

**HUMANITIES**, in the plural, signify grammar, rhetoric, and poetry, known by the name of *litera humaniores* ; for teaching

ing of which, there are professors in the universities of Scotland, called humanists.

See GRAMMAR, RHETORIC, &c.

**HUMBER**, a river formed by the Trent, the Ouse, and several other streams united. It divides Yorkshire from Lincolnshire, and falls into the German Sea at Hordeness.

**HUMBLE-BEE**, the english name of several species of apes, distinguished by their colours, black, tawney, reddish, &c. See the article APIS.

**HUMECTATION**, in pharmacy, the moistening, or preparing medicines by steeping them in water; either to soften and relax their solid parts, or to prevent the evaporation of their more subtil contents.

**HUMERUS**, in anatomy, the upper part of the arm, between the scapula and elbow.

The os humeri or brachii, as it is called, is articulated at one end with the scapula, and at the other to the ulna and radius. See the articles ARM, BRACHIUM, &c. As to the motion of the os humeri, it is evidently the most free and extensive of that of any bone in the human body; being furnished with several flexor and extensor muscles. See FLEXOR and EXTENSOR.

*Luxation of the HUMERUS.* This bone, from the length and laxity of its ligaments, the largeness of its motion, and the shallowness of the cavity in the scapula into which it is articulated, is very subject to be luxated.

As soon as this is discovered to be the case, the patient should be seated on the floor, or on a low stool, while two assistants stretch his arm; which being sufficiently extended, the surgeon ought to elevate the head of the humerus by means of a napkin, hung about his neck, and put under the arm-pit; and at the same time move it backward and forward, as he shall see occasion, till it is happily reduced into its place. See plate CXXXIV. fig. 2.

However, it often happens, that this force is incapable of extending the arm sufficiently; so that it becomes necessary to have recourse to machines, as the ambe of Hippocrates; which consists of a pillar or fulcrum A A (pl. CXXXV. fig. 3. n° 1.) and the moveable lever B C, which is bound to the arm in the manner represented in the figure by the ligatures E E E. When this is done, the end of the lever B is carefully and gradually

pressed downward, by which means the other end C is moved upward; and thus the luxated arm is both extended, and replaced at the same time.

This instrument having received many improvements since the days of Hippocrates, we shall here give the description of a portable one, invented by Mr. Freke. It consists of two boxes, A, A, (plate CXXXV. fig. 3. n° 2.) joined together by a hinge, F, in the middle; wherein are contained, when folded together, every thing necessary for reducing a dislocated shoulder.

The length of this instrument, when shut up, is one foot eight inches, its breadth nine inches, and its thickness three inches and a quarter. When it is opened, it is kept so by two hooks fixed on the backside of it; and, when one end of it stands on the ground, the other stands high enough to become a fulcrum, or support of the lever B B, which is fixed on a roller *b*, by a large wood-screw, which turning sideways, as well as with the roller, it obtains a circumrotatory motion, so that it will serve to reduce a luxation, either backward, forward, or downward. The roller on which the lever is fixed, is just the diameter of the depth of one of the boxes, into which are driven two iron pins, the ends of which are received by the two sides of the box, which are an inch thick. The lever is two feet four inches long, and is cut off and joined again by two hinges C, to fold up so as to be contained in the boxes. On the backside of it is a hook, to keep it straight. One other end of it is to hang over the roller about an inch and a half, which is to be excavated and covered with buff leather, for the more easy reception of the head of the os humeri. Two iron cheeks D are screwed on each side of the lever, to receive thro' them an iron roller, which has two holes thro' it, to receive two cords coming from a brace E, fixed on the lower head of the os humeri; for if it be applied on the muscular part of the arm, it never fails slipping down to the joint, before you can extend the limb. The iron roller has a square end, on which is fixed a wheel G, within the cheek notched round, which works as a ratchet, on a spring-ketch underneath the lever, by which it is stopped, as you wind it with a winch; and may at pleasure be let loose, as there shall be occasion for it, by discharging the ketch.

The brace E, compared with common bandages, is of more consequence than can easily be imagined by unexperienced persons. It consists of a large piece of buff leather, big enough to embrace the arm, sewed on two pieces of strong iron curved plates, riveted together, one of them having an eye at each end to fasten two cords in; the other is bent at the ends into two hooks, which are to receive the cords, after they have crossed over the arm above.

In order to keep the patient steady in his chair from coming forward, or letting the scapula rise up on depressing the lever, after the limb is extended by the winch, there must be fixed over the shoulder a girth, H, H, with two hooks at the ends of it, long enough to reach to the ground on the other side, where it must be hooked into a ring I, screwed into the floor for that purpose.

We ought not to omit observing here, that there are several other contrivances invented both by antient and modern surgeons for reducing a luxation of the humerus; some of which the reader will find described in Heister's Surgery, P. I. B. iii. c. 7.

**HUMIDITY**, that quality in bodies whereby they are capable of wetting other bodies. This differs very much from fluidity, and seems to be merely a relative thing, depending upon the congruity of the component particles of the liquor to the pores of such particular bodies, as it is capable of adhering to, penetrating a little into, or wetting. Thus, for instance, quicksilver is not a moist thing with regard to our hands or clothes, but may be called so in reference to gold, tin, or lead, to whose surfaces it will perfectly adhere, and render them soft and moist. Even water itself, which almost wets every thing, and is the great standard of moisture and humidity, is not capable of wetting every thing, for it stands or runs easily off in globular drops from the leaves of cabbages, and many other plants, and will not wet the feathers of ducks, swans, and other water-fowls. Add that the texture alone may cause the fluid to be humid, as is plain in that neither quicksilver, lead, or bismuth alone, will stick upon glass; yet being mixed together, they will form a mass that will do so, as appears from such a composition being frequently used in foliating looking-glasses.

**HUMIDUM RADICALE**, or *radical moisture*, among physicians, seems to amount to no more than the purest and most delicate part of the nutritious matter in a condition to be assimilated.

By too much heat, as in fevers, hætics, &c. this humidity is too hastily exhausted and spent.

**HUMILIS MUSCULUS**, one of the depressor-muscles of the eye. See **EYE**.

**HUMMING-BIRD**; *trochilus*, in ornithology, a genus of birds, of the order of the passerines, remarkable for being the smallest of all known birds. Their beak is of a subulated figure, but fine as a thread: it is longer than the head, and not perfectly straight: add to this, that they have a fine tube or pipe, which they can extend beyond the point of the beak. Of this singular genus, there are several elegant species. 1. The least species of all the humming birds is figured (plate CXXXVI. fig. 1.) of its natural bigness and shape: the upper part of its body is of a dirty brown, and the under part of a dirty white. 2. The little brown one, variegated with dark spots, is likewise figured (*ibid.* fig. 2.) as big as life. 3. The crested humming-bird, represented (*ibid.* fig. 3.) as big as the life, is a very elegant species: the top of the head, from the bill to the hinder part which ends in a crest, is first green, and, towards the hinder part, dark blue; both of a fine lustre: the upper part of its body is a dark green, intermixed with gold-colour: the quill-feathers are of a purple-colour, and the tail is of a bluish black. 4. The long-tailed, black-cap humming-bird; likewise engraved (*ibid.* fig. 4.) of its natural bigness, has an extremely long tail made up of only two feathers; which being of a very loose texture, are easily ruffled with the least breath of air: this is one of the largest species.

There are a great many other species of humming-birds, a description and figures of which may be seen in Edwards's History of Birds.

**HUMORISTS**, *gli humoristi*, a celebrated academy of learned men at Rome, first established by Paul Mancini. The device of this academy is a cloud; which being raised on vapours from the salt water of the sea, returns again fresh, with this hemistich from Lucretius, *Reddit agmine dulci*.

**HUMOROSI**, the name of another academy at Cortona in Italy, which must



not be confounded with that of the humorists.

**HUMOUR**, *humor*, in a general sense, denotes much the same with liquid or fluid. See the article **FLUID**.

The antients seem to have called the nutritious juices the radical humour; and to have constituted as a cause of diseases, a disproportion betwixt the innate heat and radical moisture or humour. They also made four humours in the blood. See the article **BLOOD**.

**HUMOURS** of the eye, are the crystalline, vitreous, and aqueous; for a description of which, see the articles **EYE**, **CRYSTALLINE**, &c.

**HUMOUR** is also used for the peculiar temper of a person, arising from the constitution and prevalence of this or that humour. See the articles **CONSTITUTION** and **TEMPERAMENT**.

We frequently impute to an unlucky or cross accident, says the Abbé du Bos, those chagrines whose origin is entirely in the intemperature of our humours, or in some disposition of the air, which oppresses our machine.

**HUMOUR**, in dramatic poetry, is esteemed a subordinate species of what is more usually called manners. See **MANNERS**. Every passion wears two different faces; one serious and solemn, fit only for tragedy; and the other merry and ridiculous, called humour, and proper for comedy. The english poets have excelled those of all other nations in this particular: and, indeed, ours is the only language that has a name for it.

To be always witty only becomes a few characters; so that it is necessary to call in the assistance of humour, to prevent the other dramatic persons from going into the common style and manner: hence humour may be looked on as the true spirit and wit of comedy. See **WIT**.

**HUMULUS**, the **HOP**, in botany. See the article **HOP**.

**HUMUS**, in natural history, the name by which Linnæus calls earth. See **EARTH**.

**HUNDRED**, *hundredum*, or *centuria*, a part or division of a county, which was antiently so called from its containing an hundred families, or from its furnishing an hundred able men for the king's wars. After king Alfred's dividing this kingdom into counties, and giving the government of each county to a sheriff, these counties were divided into hundreds, of which the constable was the chief officer. The grants of hundreds were

at first made by the king to particular persons; but they are not now held by grant or prescription; their jurisdiction being devolved to the county-court; a few of them only excepted, that have been by privilege annexed to the crown, or granted to some great subjects, and still remain in the nature of a franchise.

**HUNGARICUS MORBUS**, a disease so called from its being first observed in the imperial army, in 1556.

It is thought to have been a compound fever, partaking of the nature both of the bilious and hospital fevers. See **BILIOUS** and **HOSPITAL-FEVER**.

**HUNGARY**, a kingdom bounded by the Carpathian mountains, which divide it from Poland, on the north; by Transylvania and Walachia on the east; by the river Drave, which separates it from Sclavonia, on the south; and by Austria and Moravia on the west. It is one continued plain of 300 miles long, and is situated between 16° and 23° of east lon. and between 45° and 49° of north lat. It is now subject to the empress queen.

**HUNGARY-WATER**, a distilled water, so denominated from a queen of Hungary, for whose use it was first prepared.

Quincy gives the following directions for making it. Take of fresh gathered flowers of rosemary, two pounds; rectified spirits of wine, two quarts; put them together, and distil them immediately in balneo.

Or, Take of fresh tops of rosemary, one pound and a half; proof spirit, one gallon; and distil in balneo till five pints are obtained.

**HUNGER**, an uneasy sensation, which, creates an appetite or desire of food. See the article **FOOD**.

Hunger is by some attributed to a sharp acrimonious humour, which vellicates the coats of the stomach; others, who deny the existence of any such liquor, attribute it to the attrition or rubbing of the coats of the stomach; and others, again, account for it from the acidity of the blood.

**HUNGERFORD**, a market-town of Berkshire, situated on the river Kennet, twenty-four miles west of Reading.

**HUNGRY EVIL**, among farriers, an excessive desire in horses to eat, which sometimes proceeds from catching cold, or from travelling long in frost and snow, or thro' barren places.

For the cure, give him great slices of bread,

bread, toasted and steeped in sack, to comfort his stomach; or give him wheat-flour in wine or milk, a quart at a time. But there is nothing better than to feed him moderately several times a day with good bean-bread well baked, or with oats well dried and sifted.

**HUNNINGHEN**, a town of Germany, in the langraviate of Alsace, situated on the Rhine, three miles north of Basil: east long.  $7^{\circ} 35'$ , north lat.  $47^{\circ} 37'$ .

**HUNNOBY**, a market-town in the east riding of Yorkshire, situated thirty-four miles north-east of York.

**HUNTER**, a name given to a hunting-horse. See the article **HORSE**.

**HUNTING**, the exercise or diversion of pursuing four-footed beasts of game. See the article **GAME**.

Four-footed beasts are hunted in the fields, woods, and thickets, and that both with guns and grey-hounds.

Birds, on the contrary, are either shot in the air, or taken with nets and other devices, which exercise is called fowling; or they are pursued and taken by birds of prey, which is called hawking. See the articles **FOWLING** and **HAWKING**.

The pursuing of four-footed beasts, as badgers, deer, does, roebucks, foxes, hares, &c. properly termed hunting, is a noble exercise, serving not only to recreate the mind, but to strengthen the limbs, whet the stomach, and cheer up the spirits. However, all sorts of weather are not proper for hunting; high winds and rain being great obstacles to it. In the spring season, this diversion should be taken in the night-time with nets; in the summer, the morning is the most proper time for it; and in the winter, it should only be followed from nine in the morning till two in the afternoon. The general rule is, that you place yourself under the wind, where you design to wait for game.

Hunting is practised in a different manner, and with different apparatus, according to the nature of the beasts which are hunted, a description of whom may be found under their respective articles.

With regard to the seasons, that for hart and buck-hunting begins a fortnight after midsummer, and lasts till holy-rood-day; that for the hind and doe, begins on holy-rood-day, and lasts till candle-mas; that for fox-hunting begins at christmas, and holds till lady-day; that for roe-hunting begins at michael-mas, and ends at christmas; hare hunt-

ing commences at michaelmas, and lasts till the end of February; and where the wolf and boar are hunted, the season for each begins at christmas, the first ending at lady-day, and the latter at the purification.

When the sportsmen have provided themselves with nets, spears, and a hunting-horn, to call the dogs together; and likewise with instruments for digging the ground, the following directions will be of use to them in the pursuit of each sort of game.

**Badger-HUNTING**. In doing this, you must seek the earths and burrows where he lies, and in a clear moonshine-night go and stop all the burrows, except one or two, and therein place some sacks, fastened with drawing strings, which may shut him in as soon as he straineth the bag. Some use no more than to set a hoop in the mouth of the sack, and so put it into the hole; and as soon as the badger is in the sack and straineth it, the sack slippeth off the hoop and follows him into the earth, so he lies tumbling therein till he is taken. These sacks or bags being thus set, cast off the hounds, beating about all the woods, coppices, hedges and tufts, round about, for the compass of a mile or two, and what badgers are abroad, being alarmed by the hounds, will soon betake themselves to their burrows; and observe that he who is placed to watch the sacks, must stand close and upon a clear wind; otherwise the badger will discover him, and will immediately fly some other way into his burrow. But if the hounds can encounter him before he can take his sanctuary, he will then stand at a bay like a boar, and make good sport, grievously biting and clawing the dogs, for the manner of their fighting is lying on their backs, using both teeth and nails; and by blowing up their flins defend themselves against all bites of the dogs, and blows of the men upon their noses as aforesaid. And for the better preservation of your dogs, it is good to put broad collars about their necks made of greys skins.

When the badger perceives the terriers to begin to yearn him in his burrow, he will stop the hole betwixt him and the terriers, and if they still continue baying, he will remove his couch into another chamber, or part of the burrow, and so from one to another, barricading the way before them, as they retreat,

retreat, until they can go no further. If you intend to dig the badger out of his burrow, you must be provided with the same tools as for digging out a fox; and besides, you should have a pail of water to refresh the terriers, when they come out of the earth to take breath and cool themselves. It will also be necessary to put collars of bells about the necks of your terriers, which making a noise may cause the badger to bolt out. The tools used for digging out of the badger being troublesome to be carried on men's backs, may be brought in a cart. In digging, you must consider the situation of the ground, by which you may judge, where the chief angles are; for else, instead of advancing the work, you will hinder it. In this order you may besiege them in their holds, or castles, and may break their platforms, parapets, cased-mates, and work to them with mines and countermines, until you have overcome them.

Having taken a live and lusty badger, if you would make sport, carry him home in a sack, and turn him out in your court-yard, or some other inclosed place, and there let him be hunted and worried to death by your hounds.

There are the following profits and advantages which accrue by killing this animal. Their flesh, blood, and grease, tho' they are not good food, yet are very useful for physicians and apothecaries for oils, ointments, salves, and powders for shortness of breath, the cough of the lungs, for the stone, sprained sinews, colic-aches, &c. and the skin being well dressed, is very warm and good for antient people, who are troubled with paralytic distempers.

**Buck-HUNTING.** Here the same hounds and methods are used, as in running the stag; and, indeed, he that can hunt a hart or stag well, will not hunt a buck ill.

In order to facilitate the chase, the game-keeper commonly selects a fat buck out of the herd, which he shoots in order to maim him, and then he is run down by the hounds.

As to the method of hunting the buck: the company generally go out very early for the benefit of the morning, sometimes they have a deer ready lodged, if not, the coverts are drawn till one is rowz'd; or sometimes in a park a deer is pitched upon, and forced from the herd, then more hounds are laid on to run the chase; if you come to be at a fault, the

old staunch hounds are only to be relied upon till you recover him again: if he be sunk and the hounds thrust him up, it is called an imprime, and the company all sound a recheat; when he is run down, every one strives to get in to prevent his being torn by the hounds, fallow-deer seldom or never standing at bay.

He that first gets in, cries hoo-up, to give notice that he is down and blows a death. When the company are all come in they paunch him and reward the hounds; and generally the chief person of quality amongst them *takes say*, that is, cuts his belly open, to see how fat he is. When this is done, every one has a chop at his neck, and the head being cut off is shewed to the hounds to encourage them to run only at male deer, which they see by the horns, and to teach them to bite only at the head: then the company all standing in a ring, one blows a single death, which being done all blow a double recheat, and so conclude the chase with a general halloo of hoo-up, and depart the field to their several homes, or to the place of meeting; and the huntsman, or some other, hath the deer cast cross the buttocks of his horse, and so carries him home.

**Fox-HUNTING** makes a very pleasant exercise, and is either above or below ground.

1. Above ground. To hunt a fox with hounds, you must draw about groves, thickets, and bushes near villages. When you find one, it will be necessary to stop up his earth the night before you design to hunt, and that about midnight, at which time he is gone out to prey: this may be done, by laying two white sticks across in his way, which he will imagine to be some gin or trap laid for him; or else, they may be stopped up with black-thorns and earth mixed together.

At first, only call off your sure finders, and as the drag mends, add more as you dare trust them. The hound first cast off should be old and staunch, and when you hear such a hound call on merrily, you may cast off some others to him; and when they run it on the full cry, cast off the rest: thus you shall complete your pastime. The words of comfort are the same which are used in other chases. The hounds should be left to kill the fox themselves, and to worry and tear him as much as they please: some hounds will eat him with eagerness.

When

When he is dead, hang him at the end of a pike-staff, and halloo in all your hounds to bay him; but reward them with nothing belonging to the fox, for it is not good, neither will the hounds in common eat it.

2. Under ground. If in case a fox does so far escape as to earth, countrymen must be got together with shovels, spades, mattocks, pickaxes, &c. to dig him out, if they think the earth not too great. They make their earths as near as they can in ground that is hard to dig, as in clay, stony ground, or amongst the roots of trees; and their earths have commonly but one hole; and that is straight a long way in before you come at their couch. Sometimes craftily they take possession of a badger's old burrow, which hath a variety of chambers, holes, and angles.

Now to facilitate this way of hunting the fox: the huntsman must be provided with one or two terriers to put into the earth after him, that is to fix him into an angle; for the earth often consists of many angles: the use of the terrier is to know where he lies, for as soon as he finds him he continues baying or barking, so that which way the noise is heard that way dig to him. Your terriers must be garnished with bells hung in collars, to make the fox bolt the sooner; besides the collars will be some small defence to the terriers.

The instruments to dig withal are these; a sharp pointed spade, which serves to begin the trench, where the ground is hardest, and broader tools will not so well enter; the round hollowed spade, which is useful to dig among roots, having very sharp edges; the broad flat spade to dig withal, when the trench has been pretty well opened, and the ground softer; mattocks and pickaxes to dig in hard ground, where a spade will do but little service; the coal-rake to cleanse the hole, and to keep it from stopping up; clamps, wherewith you may take either fox or badger out alive to make sport with afterwards. And it would be very convenient to have a pail of water to refresh your terriers with, after they are come out of the earth to take breath.

After this manner you may besiege a fox, &c. in their strongest holes and castles, and may break their casemates, platforms, parapets, and work to them with mines and countermines till you

have obtained what you desired. But for the managing these dogs, see TERRIERS.

*Hare-HUNTING.* As, of all chases, the hare makes the greatest pastime; so it gives no small pleasure, to see the craft of this small animal for her self-preservation. If it be rainy, the hare usually takes to the high-ways; and if she come to the side of a young grove, or spring, she seldom enters, but squats down till the hounds have over-shot her; and then she will return the very way she came, for fear of the wet and dew that hangs on the boughs. In this case, the huntsman ought to stay an hundred paces before he comes to the wood-side, by which means he will perceive whether she return as aforesaid, which if she do, he must halloo in his hounds, and call them back, and that presently, that the hounds may not think it the counter she came first.

The next thing that is to be observed, is the place where the hare sits, and upon what wind she makes her form, either upon the north or south wind; she will not willingly run into the wind, but run upon a-side, or down the wind; but if she form in the water, it is a sign she is foul and measles: if you hunt such a one, have a special regard all the day to the brook-sides, for there, and near plashe, she will make all her crossings, doublings, &c.

Some hares have been so crafty, that as soon as they have heard the sound of a horn, they would instantly start out of their form, tho' it was at the distance of a quarter of a mile, and go and swim in some pool, and rest upon some rush bed in the midst of it; and would not stir from thence till they have heard the horn again, and then have started out again, swimming to land, and have stood up before the hounds four hours, before they could kill them, swimming and using all subtilties and crossings in the water. Nay, such is the natural craft and subtilty of a hare, that sometimes, after she has been hunted three hours, she will start a fresh hare, and squat in the same form. Others having been hunted a considerable time, will creep under the door of a sheep-coat, and there hide themselves among the sheep; or when they have been hard hunted, will run in among a flock of sheep, and will by no means be gotten out from among them, till the hounds are coupled up and the sheep driven into their pens. Some

of them (and that seems somewhat strange) will take the ground like a coney, and that is called, *going to the vault*. Some hares will go up one side of the hedge, and come down the other, the thickness of the hedge being the only distance between the courses. A hare that has been sorely hunted, has got upon a quickset hedge, and ran a good way upon the top thereof, and then leapt off upon the ground. And they will frequently betake themselves to furz-bushes, and will leap from one to the other, whereby the hounds are frequently in default.

Having found where a hare hath relieved in some pasture or corn-field, you must then consider the season of the year, and what weather it is; for if it be in the spring-time or summer, a hare will not then set in bushes, because they are frequently infested with pismires, snakes, and adders; but will set in cornfields, and open places. In the winter-time, they set near towns and villages, in tufts of thorns and brambles, especially when the wind is northerly or southerly. According to the season and nature of the place where the hare is accustomed to sit, there beat with your hounds, and start her; which is much better sport than traying of her from her relief to her form.

After the hare has been started, and is on foot, then step in where you saw her pass, and halloo in your hounds, until they have all undertaken it, and go on with it in full cry; then recheat to them with your horn, following fair and softly at first, making not too much noise either with horn or voice; for at the first, hounds are apt to overshoot the chace thro' too much heat. But when they have run the space of an hour, and you see the hounds are well in with it, and stick well upon it, then you may come in nearer with the hounds, because by that time their heat will be cooled, and they will hunt more soberly. But, above all things, mark the first doubling, which must be your direction for the whole day; for all the doublings that she shall make afterwards will be like the former, and according to the policies that you shall see her use, and the place where you hunt, you must make your compasses great or little, long or short, to help the defaults, always seeking the moistest and most commodious places for the hounds to scent in.

To conclude; those who delight in hunting the hare, must rise early, lest they be deprived of the scent of her foot-steps.

*Hart or Stag-HUNTING.* Gesner, speaking of hart-hunting, observes, that this wild, deceitful, and subtle beast frequently deceives its hunter, by windings and turnings. Wherefore, the prudent hunter must train his dogs with words of art, that he may be able to set them on, and take them off again at pleasure.

First of all, he should encompass the beast in her own layer, and so unharbour her in the view of the dogs, that so they may never lose her slot or footing. Neither must he set upon every one, either of the herd, or those that wander solitary alone, or a little one, but partly by sight, and partly by their footing and fumets, make a judgment of the game, and also observe the largeness of his layer.

The huntsman, having made these discoveries in order to the chace, takes off the couplings of the dogs, and some on horseback, the others on foot, follow the cry, with the greatest art, observation, and speed, remembering and intercepting him in his subtle turnings and headings; with all agility leaping hedges, gates, pales, ditches: neither fearing thorns, down hills nor woods, but mounting fresh horse, if the first tire; follow the largest head of the whole herd, which must be singled out of the chace; which the dogs perceiving, must follow; not following any other. The dogs are animated to the sport by the winding of horns, and the voices of the huntsmen. But sometimes the crafty beast sends forth his little squire to be sacrificed to the dogs and hunters, instead of himself, lying close the mean time. In this case, the huntsman must sound a retreat, break off the dogs, and take them in, that is, leam them again, until they be brought to the fairer game; which riseth with fear, yet still striveth by flight, until he be wearied and breathless. The nobles call the beast a wise hart, who, to avoid all his enemies, runneth into the greatest herds, and so brings a cloud of error on the dogs, to obstruct their farther pursuit; sometimes also beating some of the herd into his footings, that so he may the more easily escape, by amusing the dogs. Afterwards he betakes himself to his heels again, still running with the wind, not only for the sake of refreshment, but also because by this means

he can the more easily hear the voice of his pursuers, whether they be far from him, or near to him. But at last being again discovered by the hunters and sagacious scent of the dogs, he flies into the herds of cattle, as cows, sheep, &c. leaping on a cow or ox, laying the fore parts of his body thereon, that so touching the earth only with his hinder feet, he may leave a very small or no scent at all behind, for the hounds to discern. But their usual manner is, when they see themselves hard beset, and every way intercepted, to make force at their enemy with their horns, who first comes upon him, unless they be prevented by spear or sword. When the beast is slain, the huntsman with his horn windeth the fall of the beast, and then the whole company comes up, blowing their horns in triumph for such a conquest; among whom, the skillfullest opens the beast, rewards the hounds with what properly belongs to them, for their future encouragement; for which purpose the huntsmen dip bread in the skin and blood of the beast, to give to the hounds.

It is very dangerous to go in to a hart at bay, of which there two sorts, one on land and the other in water. Now if the hart be in a deep water, where you cannot well come at him, then couple up your dogs; for should they continue long in the water, it would endanger their surf-bating or foundering. In this case, get a boat, and swim to him, with dagger drawn, or else with rope that has a noose, and throw it over his horns; for if the water be so deep that the hart swims, there is no danger in approaching him; otherwise you must be very cautious.

As to a land-bay, if a hart be furnished, then you must consider the place; for if it be in a plain and open place, where there is no wood nor covert, it is dangerous and difficult to come in to him; but if he be on a hedge-side, or in a thicket, then, while the hart is staring on the hounds, you may come softly and covertly behind him, and cut his throat. If you miss your aim, and the hart turn head upon you, then take refuge at some tree; and when the hart is at bay, couple up your hounds; and when you see the hart turn head to fly, gallop in roundly to him, and kill him with your sword.

*Directions at the death of a HART or BUCK.*

The first ceremony, when the huntsman comes in to the death of a deer, is to cry, *we are haunch*, that the hounds may not

break in to the deer; which being done, the next is the cutting his throat, and there blooding the youngest hounds, that they may the better love a deer, and learn to leap at his throat: then the mort having been blown, and all the company come in, the best person, who hath not taken say before, is to take up the knife that the keeper or huntsman is to lay across the belly of the deer, some holding by the fore-legs, and the keeper or huntsman drawing down the pizzle, the person who takes say, is to draw the edge of the knife leisurely along the middle of the belly, beginning near the basket, and drawing a little upon it, enough in the length and depth to discover how fat the deer is; then he that is to break up the deer, first slits the skin from the cutting of the throat downwards, making the arber, that so the ordure may not break forth, and then he paunches him, rewarding the hounds with it.

In the next place, he is to present the same person, who took say, with a drawn hanger, to cut off the head of the deer. Which being done, and the hounds rewarded, the concluding ceremony is, if it be a stag, to blow a tripple mort; and if a buck, a double one; and then all who have horns, blow a recheat in concert, and immediately a general whoop, whoop.

*Otter-HUNTING* is performed with dogs, and also with a sort of instruments, called otter-spears; with which when they find themselves wounded, they make to land, and fight with the dogs, and that most furiously, as if they were sensible that cold water would annoy their green wounds.

There is indeed craft to be used in hunting them; but they may be caught in snares under water, and by river-sides; but great care must be taken, for they bite sorely and venomously; and if they happen to remain long in the snare, they will not fail to get themselves free by their teeth.

In hunting them, one man must be on one side of the river, and another on the other, both beating the banks with dogs; and the beast not being able to endure the water long, you will soon discover if there be an otter or not in that quarter; for he must come out to make his spraints, and in the night sometimes to feed on grass and herbs.

If any of the hounds finds out an otter, then view the soft grounds and moist places,

places, to find out which way he bent his head; if you cannot discover this by the marks, you may partly perceive it by the spraints; and then follow the hounds, and lodge him as a hart or deer. But if you do not find him quickly, you may imagine he is gone to couch somewhere farther off from the river; for sometimes they will go to feed a considerable way from the place of their rest, choosing rather to go up the river than down it. The persons that go a hunting otters, must carry their spears, to watch his vents, that being the chief advantage; and if they perceive him swimming under water, they must endeavour to strike him with their spears, and if they miss, must pursue him with the hounds, which, if they be good and perfectly entered, will go chanting and trailing along by the river side, and will beat every root of a tree, and osier-bed, and tuft of bull-rushes; nay, they will sometimes take water, and bait the beast, like a spaniel, by which means he will hardly escape.

**Roe-buck-HUNTING** is performed divers ways, and very easily in the woods.

When chased, they usually run against the wind, because the coolness of the air refreshes them in their course; therefore the huntmen place their dogs with the wind: they usually, when hunted, first take a large ring, and afterwards hunt the hounds. They are also often taken by counterfeiting their voice, which a skilful huntsman knows how to do by means of a leaf in his mouth. When they are hunted, they turn much and often, and come back upon the dogs directly; and when they can no longer endure, they take foil, as the hart does, and will hang by a bough in such a manner; that nothing of them shall appear above the water but their snout, and they will suffer the dogs to come just upon them before they will stir.

The venison of a roe-buck is never out of season, being never fat, and therefore they are hunted at any time; only that some favour ought to be shown the doe, while she is big with fawn, and afterwards till her fawn is able to shift for himself; but some roe-does have been killed with five fawns in their bellies.

He is not called, by the skilful in the art of hunting, a great roe-buck, but a fair roe-buck; the herd of them is called a bevy: and if he hath not bevy-grease upon his tail, when he is broken up, he is more fit to be dog's meat than man's meat.

The hounds must be rewarded with the bowels, the blood, and feet slit asunder, and boiled all together: this is more properly called a dole, than a reward.

**HUNTING-MATCH.** The first thing that is to be considered by one who designs to match his horse for his own advantage, and his horse's credit, is not to flatter himself with the opinion of his horse, by fancying that he is a swift, when he is but a slow galloper; and that he is a whole-running-horse (that is, that he will run four miles without a sob at the height of his speed) when he is not able to run two or three. Very probably some gentlemen are led into this error, by their being mistaken in the speed of their hounds, who, for want of trying them against other dogs that have been really fleet, have supposed their own to be so, when, in reality, they are but of a middling speed: and because their horse, when trained, was able to follow them all day, and upon any hour, to command them upon deep as well as light earths, have therefore made a false conclusion, that their horse is as swift as the best; but upon trial against a horse that has been rightly trained after hounds that were truly fleet, have bought their experience perhaps full dear. Therefore it is advisable for all lovers of hunting to procure two or three couple of tried hounds, and once or twice a week to follow after them a train-scent, and when he is able to top them on all sorts of earth, and to endure heats and colds stoutly, then he may better rely on his speed and toughness.

That horse which is able to perform a hare-chase of five or six miles briskly and courageously, till his body be as it were bathed in sweat; and then, after the hare has been killed, in a nipping frosty morning, can endure to stand till the sweat be frozen on his back, so that he can endure to be pierced with the cold as well as the heat; and then even in that extremity of cold, to ride another chase as briskly and with as much courage as he did the former; that horse which can thus endure heats and colds, is most valued by sportsmen. Therefore, in order to make a judgment of the goodness of a horse, observe him after the death of the first hare, if the chase has been any thing brisk; if when he is cold, he shrinks up his body, and draws his legs up together, it is an infallible sign of want of vigour and courage: the like may be done by the slackening of his girths after the first chase,

and from the dulness of his teeth, and the dulness of his countenance, all which are true tokens of faintness, and being tired ; and such a horse is not to be relied on, in case of a wager.

Here it will not be improper to take notice of the way of making matches in former times, and the modern way of deciding wagers. The old way of trial was, by running so many train-scents after hounds, as was agreed upon between the parties concerned, and a bell-course, this being found not so uncertain, but more durable than hare-hunting ; and the advantage consisted in having the trains led on earth most suitable to the qualifications of the horses. But now others choose to hunt the hare till such an hour, and then to run this wild-geese-chace, a method of racing that takes its name from the manner of the flight of wild-geese, which is generally one after another ; so the two horses after running of twelvescore yards, had liberty, which horse soever could get the leading, to ride what ground he pleased, the hindmost horse being bound to follow him, within a certain distance agreed on by articles, or else to be whipped up by the triers or judges which rode by ; and whichever horse could distance the other, won the match.

But this chace was found by experience so inhuman, and so destructive to good horses, especially when two good horses were matched ; for neither being able to distance the other, till both were ready to sink under their riders through weakness, oftentimes the match was fain to be drawn, and left undecided, though both the horses were quite spoiled.

This brought up the custom of train-scents, which afterwards was changed to three heats, and a straight course ; and that the lovers of horses might be encouraged to keep good ones, plates have been erected in many places in England. The fever of these before you come to the course, if your horse be fiery and mettled, the better ; and the shorter the distance, the better. Also, above all things, be sure to make your bargain to have the leading of the first train, and then make choice of such grounds where your horse may best show his speed, and the fleetest dogs you can procure : give your hounds as much law before you as your triers will allow, and then, making a loose, try to win the match with a wind ; but if you fail in this attempt, then bear your horse,

and save him for the course ; but if your horse be slow, but well-winded, and a true spurred nag, then the more train-scents you run before you come to the straight course, the better. But here you ought to observe to gain the leading of the first train ; which, in this case you must lead upon such deep earths, that it may not end near any light ground : for this is the rule received among horsemen, that the next train is to begin where the last ends, and the last train is to be ended at the starting-place of the course ; therefore remember to end your last on deep earths, as well as the first.

**HUNTINGDON**, the capital of Huntingdonshire, situated on the river Ouse, fifty-six miles north of London : west lon.  $15^{\circ}$ , and north lat.  $52^{\circ} 23'$ .

It sends two members to parliament.

**HUQUAM**, a province of China, bounded by Honan on the north, and by Quamsi and Canton on the south ; lying between  $25^{\circ}$  and  $30^{\circ}$  of north latitude.

**HURA**, the **SAND-BOX-TREE**, in botany, a genus of the *monoecia monadelphica* class of plants, the male flowers of which are arranged in an imbricated amentum ; the antheræ are sessile, and adhere to the amentum ; the female flower has neither calyx nor corolla ; its style is funnel-shaped, and the fruit is a capsule consisting of twelve cells, in each of which is contained a single seed.

**HURDLES**, in fortification, twigs of willows or osiers interwoven close together, sustained by long stakes, and usually laden with earth.

Hurdles, called also clays, are made in the figure of a long square ; the length being five or six feet, and the breadth three, or three and an half : the closter they are woven, the better. They serve to render batteries firm, or to consolidate the passage over muddy ditches ; or to cover traverses and lodgments, for the defence of the workmen, against the fire-works, or the stones, that may be thrown against them.

**HURDLES**, in husbandry, certain frames, made either of split timber, or of hazel-rod, wattled together, to serve for gates in inclosures, or to make sheepfolds, &c.

**HURDS**, or **HOARDS**, of flax, or hemp, the coarser parts separated in the dressings, from the tear or fine stuff.

**HURLE-BONE**, in a horse, a bone near the middle of the buttock, very apt to go out of its sockets with a hurt or strain.

**HURLERS**,



**HURLERS**, a number of large stones set in a square figure, near St. Clare, in Cornwall, so called from an odd opinion held by the common people, that they are so many men petrified, or changed into stones, for profaning the sabbath-day, by hurling the ball, an exercise for which the people of that county have been always famous. The hurlers are oblong, rude, and unhewed. Some suppose them to have been trophies erected in memory of some battle; others take them for boundaries, to distinguish lands; and others hold them to be sepulchral monuments.

**HURON**, a vast lake of north America, situated between  $84^{\circ}$  and  $89^{\circ}$  west long. and between  $43^{\circ}$  and  $46^{\circ}$  north lat. from whence the country contiguous to it is called the country of the Hurons, whose language is spoken over a great extent in the southern parts of north America. See the article **ALGONQUIN**.

**HURRERS**, a name formerly given to the cappers and hat-makers of London.

**HURRICANE**, a furious storm of wind, owing to a contrariety of winds. See the article **WIND** and **WHIRLWIND**.

Hurricanes are frequent in the West-indies, where they make terrible ravages, by rooting up trees, destroying houses and shipping, and the like.

The natives, it is said, can foretel hurricanes by the following prognostics: 1. All hurricanes happen either on the day of the full, change, or quarter of the moon. 2. From the unusual redness of the sun, the great stillness and at the same time turbulence of the skies, swelling of the sea, and the like, happening at the change of the moon, they conclude there will be a hurricane next full-moon; and if the same signs be observed on the full-moon, they may expect one next new-moon.

As to the cause of hurricanes, they undoubtedly arise from the violent struggle of two opposite winds. Now as the wind betwixt the tropics is generally easterly, and upon the sun's going back from the northern tropic, the western winds pour down with violence upon those parts, the opposition of these contrary winds cannot fail to produce an hurricane.

Hurricanes shift not through all the points of the compass, but begin always with a north wind, veer to the east, and then cease; and their shifting between these two points is so sudden and violent, that it is impossible for any ship to veer with

it; whence it happens that the sails are carried away, yards and all, and sometimes the masts themselves wreathed round like an osier.

**HUSBAND**, *maritus*, a man joined or contracted with a woman in marriage.

By marriage the husband has power over his wife's person; but if he threaten to kill her, &c. she may make him find surety of the peace: he has likewise power over the wife's estate; and if she have fee, he gains a freehold in her right. He also gains her chattels real, as terms for years, &c. and all personal chattels in the possession of the wife, are the husband's; but where the wife is out of possession, or the chattels are debts, or things in action, in case they are not recovered by him and his wife, the husband shall not be entitled to have them. A husband cannot alien the lands of his wife, only by fine wherein she joins; or make leases of her estate, but where she is made a party, and the rent reserved to husband and wife, and the heirs of the wife, &c. nor shall the wife's own acts, as to her estate, bind even herself without a fine levied, when she is examined by writ, if she does it freely, &c.

The husband shall be tenant by the courtesy of his wife's land, after her death, where issue is born between them; and the wife shall have dower in her husband's lands, after his decease; also her necessary apparel, &c. and if she survives the husband, she shall have her terms for years, or chattels real, again, where the husband has not altered the property: yet in a husband's life-time the wife is disabled to make any contract without his consent, unless it is for necessities according to his degree and estate; and notwithstanding she may use the goods of her husband, she may not dispose of, or pawn them; though, if she take them away, it is not felony in her. As a husband is not obliged by his wife's contract, without notice and assent; so he is not bound by the receipt of his wife, for his money. Although a wife be very lewd, if she lives with her husband, he is chargeable for all necessities for her; and so he is in case he runs away from her, or turns her away. It is otherwise if she goes away from the husband; then, as soon as such separation is notorious, whoever gives her credit, does it at his peril, and her husband is not liable, unless he takes her again; though here, if the husband receives her, or comes after her, and lies

with her but one night, that may make him chargeable for her debts.

**HUSBANDRY**, denotes much the same with agriculture. See **AGRICULTURE**. As there is no subject of more general advantage than the cultivation of lands, we have given the operations and improvements thereof, under a great variety of articles, as **PLOWING, FALLOWING, INCLOSURES, DRAIN, HEDGE, DITCH, SOWING, WEEDING, HOEING, CORN, PASTURE, HAY, &c.**

The New Method of Horse-hoeing Husbandry, written by the ingenious Jethro Tull, has now been published some years, so that a pretty good judgment may be formed of the performance. See the article **HOEING**.

Every man, who has considered the principles upon which this method of culture is founded, may discern how far his theory is consistent with nature; though, it is probable, few have as yet made sufficient experiments, to be fully informed of its worth. How it has happened, that what proposes such advantages, has been so long neglected in this country, may be matter of surprize to those who are unacquainted with the characters of the men on whom its practice depends; but to those who know them thoroughly, it can be none: for it is certain that very few of them can be prevailed on to alter their usual methods, though their continuing therein, renders them unable to maintain their families and pay their debts: but what is still more to be lamented, those who are averse to improvements, dissuade others also from thinking of them. But as the methods commonly used, together with the mean price of grain, have every where reduced the farmers so low that they pay their rents very ill, and in many places throw up their farms, the cure of these evils is certainly an object worthy of the public attention: for if the proprietors must be reduced to cultivate their own lands, which cannot be done by the hands of these obstinate and indocile people, it is easy to discern on which side his ballance of profit and loss will turn. This consideration, together with many others which might be urged, hath induced us to recommend this treatise to the serious attention of all who wish well to their country; in hopes that some may be prevailed on, from a regard either to the public good or their own interest, to give the method proposed in a fair and impartial trial; for

could it be introduced into several parts of Great Britain, by men of generous and benevolent principles, their example might, in time, establish the practice, and bring it into general use; which is scarce to be expected, by any other means.

It is therefore to such only as are qualified to judge of a theory, from the principles on which it is founded, that we do ourselves the honour to address them, to give this essay an attentive reading, and to try the experiments with proper care. As a motive to this, it is to be observed, that, though the method of culture proposed by Mr. Tull, has made little progress in England, it is not likely to meet with the same neglect abroad, especially in France, where a translation of his book was undertaken, at one and the same time, by three different persons of consideration, without the privacy of each other; but afterwards two of them put their papers into the hands of the third, M. Du Hamel du Monceau, of the Royal Academy of Sciences at Paris, and of the Royal Society of London, who has published a book, intitled, *A Treatise on Tillage, on the principles of Mr. Tull*. The ingenious author has, indeed, in some measure altered the method observed by Mr. Tull, in his book; yet has very exactly given his principles and rules; but as he had only seen the first edition of the Horse-hoeing Husbandry, so he is very defective in his descriptions of the ploughs and drills, which in that was very imperfect, and was afterwards amended by Mr. Tull, in his additions to that essay. One of the principal reasons for taking notice of this book, is to shew the comparison this author has made between the old method and the new. By his calculation, the profits arising from the new are considerably more than double those of the old. For, according to him, the profits of twenty acres of land, for ten years, amount, at  $10\frac{1}{2}$  d. per livre.

liv. l. s. d.

By the old method to 3000, or 131 3 0  
By the new method to 7650, or 334 13 9  
Which makes a prodigious difference in favour of the latter. As this computation was made by one who cannot be supposed to have any prejudice in favour of Mr. Tull's scheme, it will naturally find more credit with the public, than any comparison made by Mr. Tull himself, or by those who approve his practice. There have appeared no objections against Mr. Tull's principles or practice, that may

may not be equally urged against every sort of improvement: one of the principal is, its being impracticable in common fields, without the concurrence of every one who occupies land in the same field. But does not this equally affect the old husbandry? for every such person is obliged to keep the turns of plowing, fallowing, &c. with the other occupiers; so that if any of them were inclinable to improve their lands, by sowing grass-feed, or any other method of culture, they are under the same difficulties as they would be, were they to practice Mr. Tull's method.

Others object, that the introducing this sort of husbandry is unnecessary, since the improvements made by grass-seeds are so very considerable: besides, the returns made by the fold and dairy being much quicker than by grain, they engage the farmer to mix ploughing and grazing together. But this can have no weight; for it is well known, that in the farms where the greatest improvements have been made by grass-seeds, the dressing required for the arable-land often runs away with most of the profit of the whole farm, especially when the price of grain is low. If this be the situation of the most improved farms, what must be the case of those which chiefly consist of arable-land, where most of the dressing must be purchased at a great price, and often fetched from a considerable distance. This, together with the great expence in servants and horses, unavoidable in arable farms, shew the advantages the grazier has over the ploughing farmer. It is therefore much to be wished, that the practice of mixing the two sorts of husbandry, were more generally used in every part of the kingdom; and here we apprehend Mr. Tull's method of culture would be the surest way to improve both. For though Mr. Tull chiefly confined the practice of his method to the production of grain, yet it may be extended to every vegetable which is the object of culture in the fields, gardens, and woods; and perhaps may be applied to other crops to equal if not to greater advantage than to corn. In the vineyard it hath been long practised with success; and it may be used in the hop-ground with no less advantage. For the culture of beans, pease, woad, madder, and other large-growing vegetables, and for lucern, saintfoin, and the larger grasses, we conceive it the most profitable method, since in all

these crops, one sixth part of the seed now commonly sown, will be sufficient for the same quantity of land, and yet the crop will be much greater. It may also be used with equal advantage in our colonies in America in the culture of sugar-canes, indigo, cotton, and rice.

It has been objected that it is practicable only on such lands as are soft and light, and not at all on stiff or stony ground: but the hoe-plough has been long used in vineyards, where the soil is stronger and abounds with stones full as much as any part of this country; though the use of this plough is attended with some difficulties upon such land, for wheat, or plants of low growth, whose roots may be in danger of being turned out of the ground, or their tops buried by the clods or stones; yet none of the larger growing plants are subject to these inconveniencies. Besides, the stronger the soil is, the more benefit it will receive from this method of culture, if the land be thereby more pulverized; which will certainly be the consequence, where the method laid down by Mr. Tull is duly observed.

But as most instruments, in their first use, are attended with some difficulty, the hoe-plough has been complained of as cumbersome and unweildy both to the horse and ploughman. But it is proper here to observe, that the swing-plough, commonly used in the land about London, will do the business of the hoe-plough in all ground that is not very strong or very stony; and that where it is so, the foot-plough, made proportionably strong; will completely answer all purposes: but then, when these are used to hoe corn, the board on the left hand of the plough, answering the mould-board, must be taken off, otherwise, so much earth will run to the left side, as to injure the crop when it is low.

The drills are excellent instruments, yet we imagine them capable of farther improvements. Parallel grooves, at about an inch asunder, round the inside of the hopper, would shew the man who follows the drill, whether or no both boxes vent the seed equally. By an hitch from the plank to the harrow, the latter may be lifted to a proper height, so as not to be in the way when the ploughman turns at the head-land. Two light handles on the plank, like those of the common plough, would enable the person who follows the drill, to keep it from falling off the middle of the ridge: it may be useful al-

so in wet weather, to double the drill; by which means two ridges may be sown at the same time, the horse going between them: for the planks of two drills, each plank having one of the shafts fixed to it, may be joined end to end by two flat bars of iron, one on each side, well secured by iron-pins and screws; and by corresponding holes in the planks and bars, the distance between the drills may be altered, according to the different spaces between the ridges.

We shall now annex a computation of the

expence and profit both of the old method of culture and the new, experimentally tried by a gentleman of veracity, in a country where the soil was light and chalky, that is, of the same nature with that from whence Mr. Tull drew his observations. In the new husbandry, every article is put at its full value, and the crop of each year is four bushels short of the other; though, in several years experience, it has equalled, and generally exceeded, those of the neighbourhood in the old way.

### An Estimate of the Expence and Profit of Ten Acres of Land, in Twenty Years.

#### I. In the Old Way.

The first year for wheat costs 33l. 5s. viz.	1. s. d.	
First ploughing at 6s. per acre	3 0 0	
Second and third ditto, at 8s. per acre,	4 0 0	1. s. d.
Manure, 30s. per acre,	15 0 0	22 0 0
Two harrowings and sowings, at 2s. 6d. per acre,	1 5 0	
Seed, three bushels per acre, at 4s. per bushel,	6 0 0	
Weeding, at 2s. per acre,	1 0 0	
Reaping, binding, and carrying in, at 6s. per acre,	3 0 0	11 5 0
Second year for barley costs 11l. 6s. 8d. viz.	33 5 0	
Once ploughing, at 6s. per acre,	3 0 0	
Harrowing and sowing, at 1s. 6d. per acre,	0 15 0	
Seed, four bushels per acre, at 2s. per bushel,	4 0 0	
Weeding, at 1s. per acre,	0 10 0	
Cutting, raking, and carrying, at 3s. 2d. per acre,	1 11 8	
Grass-seeds, at 3s. per acre,	1 10 0	11 6 8
Third and fourth years, lying in grass, cost nothing.	44 11 8	
So that the expence of ten acres in four years comes to 44l. 11s. 8d.	222 18 4	
and in twenty years to	35 0 0	
First year's produce is half a load of wheat per acre, at 7l. per acre	20 0 0	
Second year's produce is two quarters of barley per acre, at 1l. per acre	15 0 0	
Third and fourth years grass is valued at 1l. 10s. per acre	70 0 0	
So that the produce of ten acres in four years, is	350 0 0	
And in twenty years it will be	222 18 4	
Deduct the expence	127 1 8	
And there remains clear profit on ten acres in twenty years by the old way		

#### II. In the New Way.

First year's extraordinary expence is	
For ploughing and manuring the land, the same as in the old way	22 0 0
Ploughing once more, at 4s. per acre	2 0 0
Seed, nine gallons per acre, at 4s. per bushel,	2 5 0
Drilling, at 7d. per acre,	0 5 10
Hand-hoeing and weeding, at 2s. 6d. per acre,	1 5 0
Horse-hoeing, six times, at 10s. per acre,	5 0 0
Reaping, binding, and carrying in, at 6s. per acre,	3 0 0
The standing annual charge on ten acres is	13 15 10
Therefore the expence on ten acres in twenty years is	275 16 8
Add the extraordinaries of the first year, and the sum is	297 16 8
The yearly produce is at least two quarters of wheat per acre, at 1s. 8s. per quarter, which on ten acres in twenty years amounts to	560 0 0
Therefore, all things paid, there remains clear profit on ten acres in twenty years, by the new way	262 3 4

So that the profit on ten acres of land, in twenty years, in the new way, exceeds that in the old way by 135 l. 1 s. 8 d. an ample encouragement to practise a scheme, by which so great an advantage will arise from so small a quantity of land in the compass of a twenty-one years lease. It ought also to be observed, that Mr. Tull's husbandry requires no manure at all, though we have here, to prevent objections, allowed the charge of it for the first year; and moreover, that though the crop of wheat from the drilling plough is here put only at two quarters on an acre; yet Mr. Tull himself, by actual experiment and measure, found that the produce of his crop of drilled wheat, amounted to almost four quarters on an acre.

**HUSBRECE**, the same with burglary. See the article **BURGLARY**.

**HUSGABLE**, antiently signified house- rent, or some tax imposed upon houses.

**HUSK**, the same with what botanists call the calyx, or cup of a flower. See the article **CALYX**.

Petiver of the verticellate plants, as sage, rosemary, and the like, says, that it is an erroneous tho' general opinion, that the flowers of these plants contain their principal medicinal virtues; the husks being the part in which this is lodged. Thus, for instance, the fine scent of hungary-water is not owing to the flowers but husks of rosemary; since the flower alone, when clean picked of them, yields very little odour. See **HUNGARY-WATER**.

**HUSO**, the **ISINGLASS-FISH**, in ichthyology, the smooth-bodied accipenser, a river-fish larger than the sturgeon, or common accipenser. See **ACCIPENSER**. It is said to grow to twenty-four feet in length, and is thick in proportion: the rostrum or snout is long, and furnished with cirri; but its mouth is very small in proportion to the size of the fish, and is furnished with no teeth. It has only one serrated long fin on the back, a pair of pectoral and another of belly-fins, beside that near the anus. It is more frequent in the Danube than in any other part of the world. See plate **CXXXV. fig. 4.** The ichthyocolla or isinglass of the shops, famous as an agglutinant, and for fining of wines, is the produce of this fish, made by boiling down its membranous parts to a jelly. See **ICHTHYOCOLLA**.

**HUSSARS**, a kind of irregular cavalry, armed with the sabre and bayonet, are retained in the service of most princes on the continent.

They are very resolute partisans, and better in an invasion or hasty expedition, than in a set battle.

**HUSSITES**, the disciples of John Hus, a Bohemian, and curate of the chapel of Bethlehem at Prague; who, about the year 1414, embraced and defended the opinion of Wickliff of England, for which he was cited before the council of Constance, and, refusing to renounce his supposed errors, he was condemned to be burnt alive, which sentence was accordingly executed upon him at Constance. It is evident in what the pretended heresy of John Hus and Jerom of Prague, who suffered with him, consisted, from the answer they made to the council, when they were admonished to conform to the sentiments of the church: they were lovers, they said, of the holy gospel, and true disciples of Christ; that the church of Rome, and all other churches of the world, were widely departed from the apostolical tradition; that the clergy ran after pleasures and riches, lorded it over the people, affected the highest seats at entertainments, bred horses and dogs, and the revenues of the church, which belonged to the poor members of Christ, were consumed in vanity and wantonness; and that the priests were ignorant of the commandments of God, or if they did know them, paid but little regard to them. The followers of Hus were also called calixtins, taberites, and bohemian brethren.

**HUSTINGS**, a court held in Guildhall before the lord-mayor and aldermen of London, and reckoned the supreme court of the city. Here deeds may be inrolled, recoveries passed, out-lawries sued out, and replevins and writs of error determined. In this court also is the election of aldermen, of the four members of parliament for the city, &c.

This court is very antient, as appears by the laws of Edward the confessor.

Some other cities have likewise had a court bearing the same name, as Winchester, York, &c.

**HUSUM**, a port-town of Sleswic or south Jutland, situated on the German sea; subject to the duke of Holstein Gottorp: east long. 8° 30', north lat. 54° 40'.

**HUT**, a small cottage; also a soldier's lodge, otherwise called a casern. See the article **CASERN**.

**HUTHERFIELD**, a market-town in the west riding of Yorkshire: west long. 1° 34', north lat. 53° 37'.

**HUXING**

**HUXING** *of a pike*, a method of catching that fish, performed in the following manner: a person takes thirty or forty as large bladders as he can get, blows them up, and ties them close together; then at the mouth of each he ties a line, which is longer or shorter according to the depth of the water; and at the end of the line is fastened a baited hook: they are then put into a pond with the advantage of the wind, that they may gently move up and down the water. When a mackerel-pike has swallowed the hook, and is almost spent, he is taken out of the water.

**HUY**, a strong town in the bishopric of Liege, situated on the Maes, sixteen miles north-east of Namur: east long.  $5^{\circ} 15'$ , north lat.  $50^{\circ} 35'$ .

**HYACINTH**, *hyacinthus*, in botany, a genus of the *hexandria-monogynia* class of plants, the flower of which consists of a single companulated petal, divided into six reflex segments at the limb: the fruit is a roundish capsule, lightly ridged with three corners, and divided into three cells, each of which usually contains two roundish seeds.

There is a great variety of these beautiful flowers, all of which are propagated by seeds, or off-sets from the old bulbs.

**HYACINTH**, in natural history, a genus of pellucid gems, whose colour is red with an admixture of yellow.

The hyacinth, tho' less striking to the eye than any other red gems, is not without its beauty in the finest specimens. It is found of various sizes, from that of a pin's head to the third of an inch in diameter. Like common crystal, is sometimes found columnar, and sometimes in a pebble-form; and is always hardest and brightest in the larger masses.

Its colour is a dull or deadish red, with an admixture of yellow in it; and this mixed colour is found in all the variety of tints, that a prevalence of the red or of the yellow in different degrees is capable of giving it.

Our jewellers allow all those gems to be hyacinths or jacinths, that are of a due hardness with this mixed colour; and as they are of very different beauty and value in their several degrees and mixture of colours, they divide them into four kinds; three of which they call hyacinths, but the fourth, very improperly, a ruby. 1. When the stone is in its most perfect state, and of a pure and bright

flame-colour, neither the red nor the yellow prevailing, in this state they call it hyacintha la belle. 2. When it has an over proportion of the red, and that of a dusky colour than the fine high red in the former, and the yellow that appears in a faint degree in it, is not a fine, bright, and clear, but a dusky brownish-yellow, then they call it the saffron hyacinth. 3. Such stones as are of a dead whitish-yellow, with a very small proportion of red in them, they call amber-hyacinths. And, 4. When the stone is of a fine deep red, blended with a dusky and very deep yellow, they call it a rubacelle. But tho' the over-proportion of a strong red in this gem has made people refer it to the class of rubies, its evident mixture of yellow, shews that it truly belongs to the hyacinths.

The hyacinth la belle is found both in the East and West Indies. The oriental are the harder, but the american are often equal to them in colour. The rubacelle is found only in the East Indies, and is generally brought over among the rubies, but it is of little value: the other varieties are found in Silesia and Bohemia.

Our druggists usually keep under the names of hyacinths, small garnets, some of them of the smooth pebble-kind, somewhat resembling the native rubies, and others angular. They have the former from Poland, the latter principally from Bohemia: but neither of them are true hyacinths. They have sometimes, tho' rarely, the third kind, or amber-hyacinths; and if any stress were to be laid on the virtues of this stone, these are the only kind that can lay any claim to it. They have also a very small and bad kind of the amber-hyacinth, whiter than those received among the jewellers, which are found in the beds of rivers in Bohemia; these, they would persuade us, are true oriental hyacinths, but beside our knowing that the same are found in Bohemia, the want of hardness in the very finest of them, is an evident proof of the contrary. The antients have attributed great virtues to this gem; and later writers have even made it the basis of a cordial and astringent confection, which takes its name from it. It is generally said to be cordial, restorative, and moderately astringent; and some have added that it is hypnotic. But the ostentation of bringing the most costly things into medicines, rather than any rational opinion

of their virtues, seems to have given the original hint of introducing the gems into it; and if there were nothing else against it, one would be cautious of their getting into use, were it only from the uncertainty of what apothecaries meet with under their names at the druggists.

**HYACINTHIA**, an ancient grecian festival, observed at Amyclæ in Laconia, in the month Hecatombæon, in memory of the beautiful young Hyacinthus, son of Amyclos king of Sparta. It continued three days, during the first of which they shewed all imaginable signs of grief for the death of Hyacinthus: upon the second and third day, various spectacles were exhibited, and hymns sung in honour of Apollo: they likewise offered multitudes of victims, and gave rich entertainment to their friends.

**HYADES**, in astronomy, seven stars in the bull's head, famous among the poets for the bringing of rain.

The principal of them is in the left eye, called by the Arabs Aldebaran. See the articles **TAURUS** and **ALDEBARAN**.

**HYDATIDES**, in medicine, little transparent vesicles or bladders, full of water, sometimes found solitary, and sometimes in clusters, upon the liver, and various other parts, especially in hydropical constitutions.

But in a particular sense, the hydatid is a disease of the eye-lids, called also aquila. St. Yves informs us, that there sometimes comes on the edge of the cartilages of the eye-lids, or on the conjunctiva, an elevation like the bladders which appear on the skin after burns. They are as big as a pea, or a lentil; are filled with a very clear liquor, and have the name of hydatides from the lymph which they contain. Sometimes a serosity is extravasated between the conjunctiva and the membrane which covers it: it separates these membranes, and in the movement of the eye, a sort of wrinkle appears, which shews that a serosity stagnates between these membranes, and produces the swelling. This disease is not at all dangerous; it is a little troublesome when it seizes only part of the conjunctiva. The surest remedy is to prick it dexterously with the point of a lancet, and to lay it open according to the longitudinal direction of the tumour, without any other application.

**HYDATOIDES**, the same with the aqueous humour of the eye. See **EYE**.

**HYDATOSCOPIA**, called also hydro-mancy, a kind of divination or method of foretelling future events by means of water. See **HYDROMANCY**.

**HYDE**, or **HIDE**. See the article **HIDE**.

**HYDNUM**, in botany, a genus of fungi, called by some erinaceus: it is an horizontal fungus, echinated, or beset with sharp-pointed fibres on its under part. See the article **FUNGUS**.

**HYDRA**, in astronomy, a southern constellation imagined to represent a water-serpent.

The number of stars in this constellation in Ptolemy's catalogue is 25, and in the britannic catalogue, 68.

**HYDRAGOGUES**, ὑδραγωγὰ, among physicians, remedies which evacuate a large quantity of water in dropfies. See the article **DROPSY**.

Quincy observes, that the strongest cathartics chiefly answer to the character of hydragogues, in that by their forcibly shaking and velicating the bowels, and their appendages, they squeeze out water enough to make the stools appear little else.

The principal hydragogues, in the common opinion, are the juices of elder, of the root of iris, of soldanella, mechoacan, jalap, &c. In the general, all sudorific, aperitive, and diuretic medicines are truly hydragogues.

**HYDRANGÆA**, in botany, a genus of the *decandria-digynia* class of plants; the corolla whereof consists of five equal, roundish petals, greater than the cup: the fruit is a roundish didymous capsule; the two permanent styles make two beaks to it, and is rendered angular by many ribs: it is coronated by the cup, and divided into two cells by a transverse membrane: the seeds are numerous, angular, acuminate, and very small.

**HYDRARGYRUM**, a name given to mercury or quicksilver. See the article **MERCURY**.

**HYDRAULICS**, the science of the motion of fluids, and the construction of all kinds of instruments and machines relating thereto.

The laws of the motion of fluids, and the causes of their descent or rise below or above the common surface or level of the source or foundation, have been already delivered under the article fluid; and the art of conducting fluids into pipes, canals, drains, &c. as also the art of raising them, with the several ma-

chines employed for that purpose, as syphons, pumps, syringes, fountains, fire-engines, mills, &c. are described under their proper heads. See the articles **SYPHON, PUMP, SYRINGE, FOUNTAIN, ENGINE, MILL, &c.**

**Hydrostatics** explain the equilibrium of fluids at rest; upon removing which equilibrium motion ensues, and hydraulics commence.

**Hydraulics**, therefore, suppose hydrostatics, and the generality of writers, from the immediate relation between the two, join them together, and call them both either hydraulics or hydrostatics. See the article **HYDROSTATICS**.

**HYDRELÆUM**, in pharmacy, a mixture of common oil with water, which, taken internally, is emetic; but applied externally, is anodyne, and promotes suppuration.

**HYDRENTEROCELE**, in surgery, a species of hernia, wherein the intestines descend into the scrotum, together with a quantity of water. See **HERNIA**.

**HYDROCANISTERIUM**, an engine which spouts water in great quantities, and to considerable heights, in order to extinguish accidental fires in houses. See the article **ENGINE**.

**HYDROCELE**, in surgery, denotes any hernia arising from water, but is particularly used for such a one of the scrotum which sometimes grows to the size of one's head, without pain, but exceeding troublesome to the patient.

Tho' authors, says Sharp, mention several kinds of this disease, there are but two; the first is when the water is contained in the tunica vaginalis; the second, when it is contained in the cellular membrane of the scrotum. This last is always complicated with an anasarca, a kind of dropsy which consists in the extravasation of the water which lodges in the cells of the membrana adiposa. The hydrocele in this case is easily known, for the skin is shining and soft, yielding easily to a slight impression, which will remain pitted some time. The penis is also sometimes prodigiously swelled by the liquor which insinuates into the cellular membrane. There are none of these symptoms in the dropsy of the tunica vaginalis.

In the dropsy of the cellular membrane of the scrotum, some recommend the puncture with a trocar; others, to make small apertures here and there with the

point of a lancet; others, to put a small skane of silk through the skin with a needle, and to let it remain as a seton till all the water is drained off. But the two first methods yield very little relief, and the last may be more likely to induce a gangrene. Nor is there occasion for any operation at all, because the cellular membrane of the scrotum, is nothing but a continuation of the membrana adiposa, and therefore scarifications made in the skin of the small of the legs, will effectually empty the scrotum; yet sometimes there falls so great a quantity into the scrotum, that the distension is very painful, threatening a mortification: likewise the prepuce is very often so excessively dilated and twisted, that it hinders the patient from making water. In these cases, there should be an incision made on each side of the scrotum, three inches in length, quite through the skin into the cells which contain the water, and likewise two or three half an inch long in any part of the penis with a lancet or knife. The dropsy of the tunica vaginalis, is caused by an excessive accumulation of a serosity which is naturally separated in the internal surface of that tunic, in a small quantity, to moisten and lubricate the testicle.

This disorder is not often the effect of any accident. It never diminishes when once begun, but generally continues to encrease, but in some persons not so quick as others. It is tense and smooth, and ceases before or when it arrives at the rings of the abdominal vessels. When the testicle is encreased in size, the tumour is rounder, and, if not attended with an enlargement of the spermatic vessels, the cord may be easily distinguished between the tumour and the abdomen.

As to the cure, the author above-mentioned has found little success from inward medicines or outward applications, and therefore thinks it most advisable to wait till the tumour becomes troublesome, and then to tap it with a lancet. If the orifice of the skin slips away from that of the tunic, and prevents the egress of the water, you may introduce a probe, and by that means secure the exact situation of the wound. When the tunica vaginalis is very tense, the testicle itself cannot be easily distinguished; but there will be no danger of wounding it, if the inferior part of the scrotum is opened with a lancet not too long. During the

evacu-



evacuation, the scrotum must be regularly pressed ; and after the operation, a little piece of dry lint and sticking-plaster are sufficient. This is called a palliative cure, but it now and then proves an absolute one. It is dangerous to attempt a radical cure by making a large wound, either by incision or caustic, and therefore that method should be discarded.

**HYDROCEPHALUS**, in surgery, a preternatural distention of the head, to an uncommon size, by a stagnation and extravasation of the lymph, which, when collected within side of the bones of the cranium, the hydrocephalus is then termed internal ; as it is external, when retained betwixt the common integuments and the cranium.

The first kind of the disorder is seldom to be met with but in infants ; and if it is advanced to any great degree, is a dangerous case, and generally incurable. If the disorder is in its first stage, and but beginning to shew itself, it will be most advisable, according to Heister, to try what may be done by medicines, such as gentle and repeated purges, to draw the humours downwards, with corroborating medicines, internally ; while externally there is applied a large compress dipt in lime-water and spirit of lavender, or hungary water, which compress must be retained by a proper bandage. See the article **BANDAGE**.

The external hydrocephalus is distinguished by the softness of the head and skin externally ; but in the internal hydrocephalus, the head feels as hard as usual, and yet it is much more distended and enlarged. Though the external hydrocephalus is not without danger, yet it may be much more easily cured than the internal, but with the greater difficulty, as it is of a longer standing. According to the same author, the cure must be attempted as well by internal as external remedies at the same time ; such as cathartics, diaphoretics, diuretics, attenuating and strengthening medicines for internal use : and externally may be applied a compress dipped in the fomentation before-mentioned for the internal hydrocephalus. In this case the repeated chewing of tobacco in the mouth, to discharge the serosities from the head by spitting, is advisable : some foment the head with fumes of burning spirit of wine highly rectified, but if all these means prove unsuccessful, recourse must then be had to chirurgical helps, among

which you ought first to try a blister applied behind the ears on the occiput and neck, and if this does not altogether answer the intention, you may add scarification and cupping upon the same parts. See **CUPPING**.

**HYDROCERATOPHYLLUM**, in botany, a plant otherwise called ceratophyllum. See **CERATOPHYLLUM**.

**HYDROCHARIS**, the **LITTLE WATER-LILLY**, in botany, a genus of the *diccaneandria* class of plants, the male flower of which has a spathe, and is composed of three large, plain, and roundish petals ; the female flower is like the male one, only without any spathe : the fruit is a coriaceous and roundish capsule, consisting of six cells, in which are contained a great number of very small and roundish seeds.

**HYDROCORAX**, the **WATER-RAVEN**, in ornithology, a species of bucceros, with a small head and bluish back.

This bird is about the bigness of the common raven, and is a native of Tartary and China ; from whence its beak is often brought over to us as a curiosity, on account of its size, as being seven inches in length, and in the largest part, about the middle of the gibbosity, near three inches in diameter.

There is also another species, about the bigness of our common crow, the head of which is of a deep greenish cast, but with an admixture of black : the body too is of a greenish colour.

**HYDROCOTYLE**, **MARSH-PENNY-WORT**, in botany, a genus of the *pentandria-digynia* class of plants, the universal corolla of which is uniform in figure, though not in situation ; and the single corollæ are formed of five ovato-acute, patent petals : the fruit is orbicular, erect, and composed of two compressed and semi-orbicular seeds.

This plant is common with us in damp places, and is suspected of hurting sheep that feed on it ; whence it is sometimes called white-rot. See the article **ROT**.

**HYDROGRAPHY**, *ὕδρυγραφία*, the art of measuring and describing the sea, rivers, lakes, and canals.

With regard to the sea, it gives an account of its tides, counter-tides, soundings, bays, gulphs, creeks, &c. as also of the rocks, shelves, sands, shallows, promontories, harbours, the distance and bearing of one port from another, with every thing that is remarkable, whether out at sea, or on the coast.

**HYDROMANCY**, a method of divination by water, practised by the antients in this manner. They filled a cup or bowl of water: then fastening a ring to a piece of thread tied to their finger, held it over the water, and repeated a certain form of words, desiring to be satisfied with regard to their enquiry; and if the question was answered in the affirmative, the ring would strike the sides of the bowl of its own accord.

Another kind of hydromancy was to look upon the water in which the figure of several daemons used to appear. This expedient Numa is said to have made use of, to settle the ceremonies of religion.

This way of divination is said to have been used first by the Persians, and afterwards approved by Pythagoras.

**HYDROMEL**, among physicians, water impregnated with honey, either before or after fermentation.

Vinous hydromel, commonly called mead, is said to be good for the gravel. See the article MEAD.

**HYDROMETER**, an instrument to measure the gravity, density, velocity, force, &c. of water and other fluids. See the articles WATER and FLUID.

The hydrometer is one of the most useful instruments of the philosophic kind; for tho' the hydrostatical ballance be the most general instrument for finding the specific gravities of all sorts of bodies, yet the hydrometer is best suited to find those of fluids in particular, both as to ease and expedition.

This instrument should be made of copper, since ivory imbibes spirituous liquors, and thereby alters its gravity; and glass is apt to break. The most simple kind, used for finding the strength of spirits, consists of a copper-ball *Bb* (plate CXXXVII. fig. 1. n<sup>o</sup> 1.) with a brass-wire, *AB*,  $\frac{1}{4}$  of an inch thick, soldered into it. The upper part of this wire being filed flat on one side, is marked proof at *m*, because it sinks exactly to this mark in proof-spirits. There are other two marks at *A* and *B*, to shew whether the liquor be  $\frac{1}{10}$  above or below proof, according as the hydrometer sinks to *A* or emerges to *B*, when a brass-weight as *C* or *K* has been screwed on at the bottom *c*. There are also weights to be screwed on, for shewing the specific gravities of fluids quite to common water. The round part of the wire above the ball, may be marked so as to represent river-water when it sinks to *RW*,

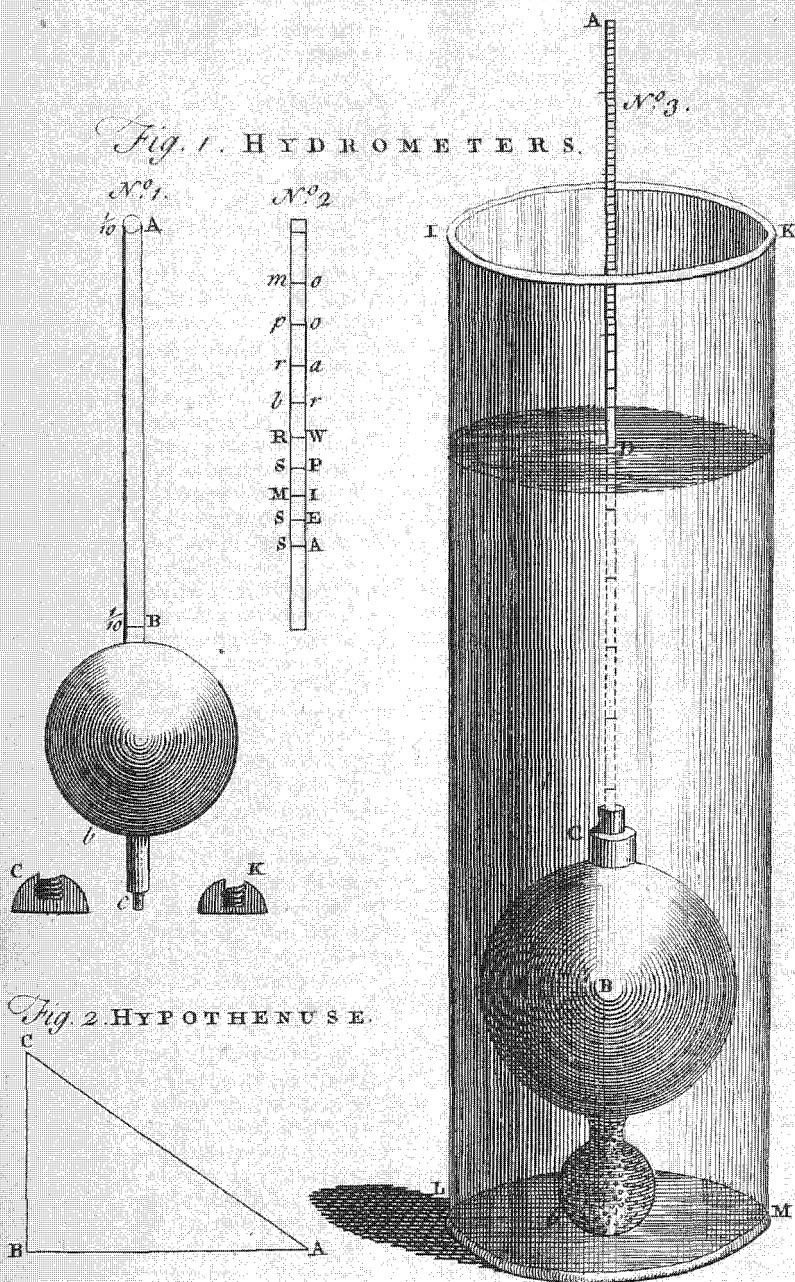
(*ibid.* n<sup>o</sup> 2.) the weight which fits the instrument for river-water being screwed on at *c*: also when put into spring-water, mineral water, sea-water, and water of salt-springs, it will emerge or rise gradually to the marks *SP*, *MI*, *SE*, *SA*; and, on the contrary, when put into Bristol-water, rain-water, port-wine, and mountain-wine, it will successively sink to the marks *br*, *ra*, *po*, *mo*.

Another kind, which serves to distinguish the specific differences of fluids to great nicety, consists of a large hollow ball *B*, (*ibid.* n<sup>o</sup> 3.) with a smaller ball *b* under it, partly filled with quick-silver or small shot, and screwed on to the lower part of the former, in order to render it but little specifically lighter than water: it has also a small short neck at *C*, into which is screwed the graduated brass-wire *AC*, which by its weight causes the body of the instrument to descend in the fluid, with part of the stem.

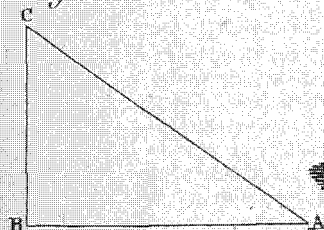
When this instrument is swimming in the liquor, contained in the jar *ILMK*, the part of the fluid displaced by it, will be equal in bulk to the part of the instrument under water, and equal in weight to that of the whole instrument. Suppose the weight of the whole were 4000 grains, then it is evident we can by this means compare together the different bulks of 4000 grains of various sorts of fluids. For if the weight *A* be such as shall cause the areometer to sink in rain-water, till its surface comes to the middle point of the stem *20*; and if, after this, it be immersed in common spring-water, and the surface is observed to stand  $\frac{1}{10}$  of an inch below the middle point *20*; it is evident that the same weight of each water differs in bulk only by the magnitude of  $\frac{1}{10}$  of an inch in the stem.

Now suppose the stem were ten inches long, and weighed 100 grains, then every tenth of an inch would be one grain weight; and since the stem is of brass, and brass is about eight times heavier than water, the same bulk of water will be equal to  $\frac{1}{8}$  of a grain; and consequently to the  $\frac{1}{8}$  of  $\frac{1}{1000}$  part, that is, a 32000th part of the whole bulk, which is a degree of exactness as great as can be desired. Yet the instrument is capable of still greater exactness, by making the stem or neck consist of a flat thin slip of brass, instead of one that is round or cylindrical: by this means we increase the surface, which is the most requisite thing;

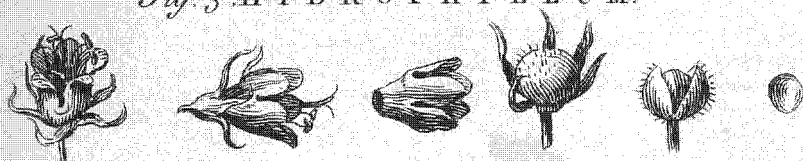
*Fig. 1. HYDROMETERS.*



*Fig. 2. HYPOTHENUSE.*



*Fig. 3. HYDROPHYLLUM.*





thing; and diminish the solidity, by which the instrument is rendered more exact.

In order to adapt this instrument to all sorts of uses, there ought to be two different stems to screw on and off in a small hole at *a*. One stem should be such a nice thin slip of brass, or rather of steel, like a watch-spring set straight, as we have just mentioned, on one side of which ought to be the several marks or divisions, to which it will sink in various sorts of waters, as rain-water, river-water, spring-water, sea-water, salt spring-water, &c. And on the other side you mark the division to which it sinks in various lighter fluids, as hot bath-water, Bristol water, Lincomb water, Cheltenham-water, port wine, mountain, madeira, and various other sorts of wine. But in this case the weight *A* on the top must be a little less than before, when it was used for the heavier waters.

But, in case of trying the strength of spirituous liquors, a common cylindric stem will do best, because of its strength and steadiness; and this ought to be so contrived that, when immersed in what is called proof-spirit, the surface of the spirit may be upon the middle point *20*; which is easily done by duly adjusting the small weight *A* on the top, and making the stem of such a length that, when immersed in water, it may just cover the ball, and rise to *a*; but, when immersed in pure spirit, it may arise to the top at *A*; then by dividing the upper and lower parts *a 20*, *A 20*, into ten equal parts each, when the instrument is immersed in any sort of spirituous liquor, it will immediately shew how much it is above or below proof.

This proof-spirit consists of half water and half alcohol, or pure spirit, that is, such as when poured upon gunpowder, and set on fire, will burn all away, and permit the powder to take fire, which it will, and flash as in the open air. But if the spirit be not so highly rectified, there will remain some phlegm or water, which will make the powder wet, and unfit to take fire. This proof-spirit of any kind, weighs seven pounds twelve ounces per gallon.

The common method of shaking the spirits in a vial, and by raising a crown of bubbles, to judge by the manner of their rising or breaking away whether the spirit be proof or near it, is very precarious,

and capable of great fallacy. There is no way so easy, quick, certain, and philosophical, as this by the aræometer, which will demonstrate infallibly the difference of bulks, and consequently specific gravities, in equal weights of spirits, to the 30, 40, or 50 thousandth part of the whole, which is a degree of accuracy, beyond which nothing can be desired.

**HYDROPHACE**, in botany, a name sometimes given to the lemma of Linnæus. See the article **LEMNA**.

**HYDROMETRY**, *υδρομετρία*, a term sometimes, tho' rarely, used to denote the mensuration of fluids, their gravity, velocity, &c. and consequently comprehending both hydraulics and hydrostatics. See **HYDRAULICS** and **HYDROSTATICS**.

**HYDROMPHALUS**, in medicine and surgery, a tumour in the navel, arising from a collection of water.

The hydromphalus is distinguished from other tumours of the navel by its being very soft, and yet not tractable and obedient to the touch, so as to diminish or enlarge by compressing it. See the article **EXOMPHALUS**.

When viewed, placed between the eye and the light, the hydromphalus is found transparent. It is to be dissolved by emollient and resolute medicines. It is also cured by a puncture made in the middle of the navel.

**HYDROMYSTES**, a name antiently given to certain officers in the greek church, whose business was to make holy-water, and sprinkle it on the people. See the article **HOLY-WATER**.

**HYDROPARASTATÆ**, a sect of heretics, the followers of Tatian.

This sect were called also encratitæ, apotactitæ, saccophori, severiani, and aquarians.

The hydroparastatæ were a branch of the manichees, whose distinguishing tenet was that water should be used in the eucharist instead of wine.

**HYDROPHANÆ**, in natural history, a genus of semi-pellucid gems, composed of crystal and earth; the latter ingredient being in large proportion, and mixed imperfectly, as in the chalcedony; and giving a general cloudiness or mistiness to the stone, but of so imperfect and irregular an admixture, as not to be capable of so good a polish as the chalcedony; and appearing of a dusky and foul surface, till thrown into water, in which they become lucid, and in some degree transparent,

rent, either in part or totally ; also changing their colour, which returns to them on being taken out of the water.

To this genus belong the oculus beli of authors, or whitish-grey hydrophanes, variegated with yellow, and with a black central nucleus ; and the oculus mundi, or lapis mutabilis, which is likewise a whitish-grey kind without veins.

**HYDROPHOBIA**, *ὑδροφοβία*, in medicine, an aversion or dread of water ; a terrible symptom of the rabies canina.

This disease generally proceeds from the bite of a mad dog, and almost always arises from the infection communicated by the bite of a mad animal ; yet it has been observed to arise spontaneously in some animals affected with acute diseases ; and we have an instance in the medical essays by Dr. Innes at Edinburgh, of a young man that had this symptom attending an inflammation of the stomach. Almost all kinds of animals may be afflicted with this disorder, and may infect other animals, and even men, as dogs, cats, wolves, foxes, horses, asses, mules, horned cattle, hogs, monkees, and cocks : but it most frequently attacks dogs, wolves, and foxes, without any previous contagion.

A hot climate ; excessive heats and sudden colds ; a long, hot, and dry season ; feeding much upon putrid, stinking, verminous flesh ; want of water ; worms generated in the kidneys, guts, brains, or nostrils, are the preceding causes of madness in these animals. When they are going to run mad, they appear dejected, shun company, and hide themselves : they will not bark, but seem to mutter or murmur, and are averse to food and water ; they will fly upon strangers, but retain some regard for their master : their ears and tails hang down, and they walk along as if they were sleepy. This is the first degree of the disease ; and though the bite is then bad, it is not at the worst. Afterwards, they begin to pant, hang out their tongues, froth at the mouth, and gape ; sometimes they seem dull and half asleep ; sometimes they will run, but not directly forward, and soon cease to know their masters ; their eyes are dejected, look watry and dusty ; their tongues are of a lead-colour ; they fall away suddenly, and grow raging mad. A bite at this time is incurable, and the nearer they are to death, with the more dreadful symptoms it is attended.

There is scarce any poison infectious so many ways as this, for it takes effect through the cloaths, without fetching blood ; by the breath of the animal drawn into the lungs ; by a touch of the froth, if recent ; by handling the wound, or instrument which was the death of the animal ; or by handling things which have been infected by any of the former means. Again, there is scarce any poison which produces such terrible effects, and causes such a wonderful change in the person infected. When it begins to work, it is most violent and quick ; and yet, as it is said, will lie dormant for twenty years together before it exerts itself. This diversity depends upon the heat of the season, the degree of the disease in the infected animal, and the temperature of the person bit ; for the bilious are soonest affected with it, the phlegmatic and hydropic the least : likewise something may be attributed to the way of living, diet, and medicines.

A healthy man infected with this contagion, according to Boerhaave, finds the effects of it discover themselves in the following order : there is a pain in the place where he was bit or received the contagion, and then wandering pains in the other parts, chiefly those that are near it ; a lassitude, heaviness, listlessness of the whole body ; inquiet troubled sleep, and terrible dreams, with convulsions and subultus of the tendons ; continual inquietude, sighs, sadness, love of solitude : thus ends the first degree of the disease. Afterwards all the symptoms encrease with a prodigious swiftness and oppression about the præcordia ; a difficult sighing, respiration, horror, a shaking and trembling at the sight of any liquid, pellucid things ; loss of appetite ; an incredible anxiety ; trembling and terrible convulsions, almost forcing the patient into a rage when any liquid is touched with the lips or tongue ; then a vomiting of dark, bilious, viscid matter, or porraceous bile ; an increased heat ; a fever, continual watching, a priapism, a confused series of wild and extravagant thoughts : here the second degree of the disease may be said to terminate. Now all the symptoms grow worse and worse : the tongue hangs out, and is rough ; the voice is hoarse ; strange horrors, starting and wild looks at the sight of water ; a frothing at the mouth ; a voluntary inclination to spit at the by-standers ; also to bite them ; the patient foams at the mouth,

mouth, gnashes with the teeth, and would do mischief if not forcibly held. His pulse and breathing fail; there is a cold sweat; the highest fury: yet during all this time, which is wonderful, the patient continues in his senses, and is afraid of doing harm. On the fourth day from the first degree of the disease, the patient falls into convulsions with great difficulty of breathing, and then dies.

The prevention and cure of this disease, except in a few instances, are very doubtful and uncertain. The preventive cure, according to Boerhaave, consists in making deep scarifications, as soon as possible, after the bite, in the part affected and those adjacent to it, that they may make a considerable discharge of blood; and then applying large cupping-glasses thereon; or it may be burnt pretty deep with an actual cautery. Then it should be made to suppurate by some corrosive application proper for that purpose; and during all that time, it should continually be fomented with a pickle made with vinegar and salt: this should be continued for six months at least: the garments he had on at the time of the bite should be cautiously laid aside, or destroyed. He should likewise, with all convenient speed, be dipt in a river, or the sea, making him believe that he is going to be drowned: this is to be often repeated; for the effect consists in terrifying the mind, and not in the salt water, as is commonly supposed: then he should be often and strongly purged with rhubarb, agaric, and the juice of elder-bark. He should be put into a sweat every morning fasting, with a mixture of aromatic vinegar, sea-salt, and hot water: his feet and hands should also be daily fomented in a warm bath, and he should wash his head, mouth, and fauces. Let him often drink cold water, and throw it up again, by vomiting; and let his drink be acidulated. His aliment should be most light and laxative, and often taken in such a quantity as to vomit it up again. He should likewise abstain from things that are too spicy, from wine, from heating things, from violent exercises, and from commotions of the mind.

The cure should be attempted when the disease is in the first degree; and, in the beginning of the second, by treating it as highly inflammatory; by letting blood from a large orifice even to a deliquium; by giving clysters soon after with nitrous or moderately salt water, thus: take

barley water, ten ounces; nitre, two drams; elder vinegar and honey of roses, each an ounce: make a clyster. Or take rue-water, ten ounces; sea-salt, two drams; vinegar impregnated with marygold-flowers, six drams; common honey, an ounce: make a clyster.

These may be repeated boldly, and with less caution than in other cases. After this let the patient be blindfolded, and thrown into a pond of cold water; or let cold water be thrown upon him, till the dread of it almost ceases: then let a large quantity be forced down his throat; let this be his treatment daily, and at night let sleep be procured.

Hoffman's sentiments on this head are greatly different from those of Boerhaave. The antients, says he, were of opinion, that all poisons were of a cold nature, because they observed that a more free afflux of blood to the external parts was restrained by spasms, for which reason they prescribed heating things, and particularly generous wines, as an universal antidote: these Celsus seems to have followed; and informs us, that the practice of old was to put the patient into a bath, and to make him sweat as long as his strength would permit, at the same time keeping the wound open, that the virus might be discharged from it; and then to give him plenty of good generous wine: this being done for two or three days, they judged him out of danger. This practice of the antients, Hoffman thinks most effectual, and condemns immersion in cold water, &c. as Boerhaave does the practice of administering acrid, drying, and heating medicines.

This may give some light into the nature of the pulvis antilyssus published by Dr. Mead, and received into the dispensatory of the college, wherein pepper is one of the ingredients. Take of the powder of ash-coloured liverwort, four drams; and of the powder of black pepper, two drams: this powder mixt together, is to be taken in warm milk in the morning fasting for four mornings together. After this the doctor orders the patient to be put into a cold bath, pond or river, for thirty days successively, early in the morning, and before breakfast: he is to remain in it with his head above water, no longer than a minute.

Dr. Sault, from his own experience, recommends another method of cure by mercurial frictions upon the cicatrices, and

and the parts adjoining, for three days successively, and then every other day : besides this, he orders the patient to take a dram and a half of *Palmarius's powder*. Dr. James is of opinion, that a vomit or two of *mercurius emeticus flavus* would be proper, the dose of which is from two to eight grains ; not omitting the *cinnabarine powder*, nor going into the cold bath in the morning for a month.

**HYDROPHORIA**, in grecian antiquity, a solemnity held at Athens and Ægina, in memory of those that perished in the deluge.

**HYDROPHYLLUM**, in botany, a genus of the *pentandria-monogynia* class of plants, the corolla whereof consists of a single campanulated petal, divided into five erect, obtuse, and emarginated segments : the fruit is a globose capsule, formed of two valves, and containing only one cell, with a single, roundish, and large seed. See plate CXXXVII. fig. 3.

**HYDROPIC**, a dropsical patient ; or a person swelled and bloated with the abundance of water. See **DROPSY**.

**HYDROPOTA**, in medicine, a person who drinks nothing but water.

It has long been controverted among physicians, whether or no the *hydropotæ* live longer than other persons.

**HYDROPS**, in medicine, the same with dropsy. See the article **DROPSY**.

**HYDROSCOPE**, an instrument antiently used for the measuring of time.

The hydroscope was a kind of water-clock, consisting of a cylindrical tube, conical at bottom : the cylinder was graduated, or marked out with divisions, to which the top of the water becoming successively contiguous, as it trickled out at the vertex of the cone, pointed out the hour.

**HYDROSTATICAL BALANCE**, a kind of ballance contrived for the easy and exact finding the specific gravities of bodies, both liquid and solid.

This instrument is of considerable use in estimating the degree of purity of bodies of all kinds ; the quality and richness of metals, ores, minerals, &c. The proportion in any mixture, adulteration, or the like : of all which the specific weight is the only adequate measure. The doctrine of the hydrostatical ballance is founded on this theorem of Archimedes, that a body heavier than water, weighs less in water than in air, by the weight of as much water as is equal to it in bulk.

We have a new hydrostatical ballance, the parts of which are as follow : A B (plate CXXXVIII. n<sup>o</sup> 1.) is the foot on which it stands ; CD is a pillar supporting a moveable brafs plate EF, fastened thereto by the screw in the knob *e*. In the end of this plate is fixed an upright piece IK, supporting another plate GH ; which slides backwards and forwards thereon, and is moveable every way about it. In the end of this plate, at H, is fixed (by a nut beneath) a wire LM, taped with a fine thread from one end to the other ; upon this moves the swan-neck slip of brafs NO, to which a very exact ballance is hung at the point N ; to one of whose scales P is appended the heavy body R, by a fine horse-hair or piece of silk S : the weight of the said body R in the air, is expressed by the weight put into the scale Q to make an equilibrium therewith, which being destroyed by immersing the solid in the fluid TV, contained in the glass WV, is again restored by weights put into the scale P. So that the weights in the scale Q compared with those in the scale P, shew at once the specific gravity of the solid R to that of the fluid TV.

The specific gravity of fluids is readily determined by weighing one and the same solid body in them severally ; for since we suppose the ballance in equilibrium with the body suspended in the air, the equilibrium will be destroyed when the solid is immersed in the fluid, and must be then restored by weights put into that scale to which the body is appended. These weights will severally express the gravities of an equal bulk of the respective fluids ; and consequently they may be thus compared with each other, or all of them with the gravity of common water, as usual, and disposed in a proper table ; making water 1.000. See *Table of specific GRAVITIES*.

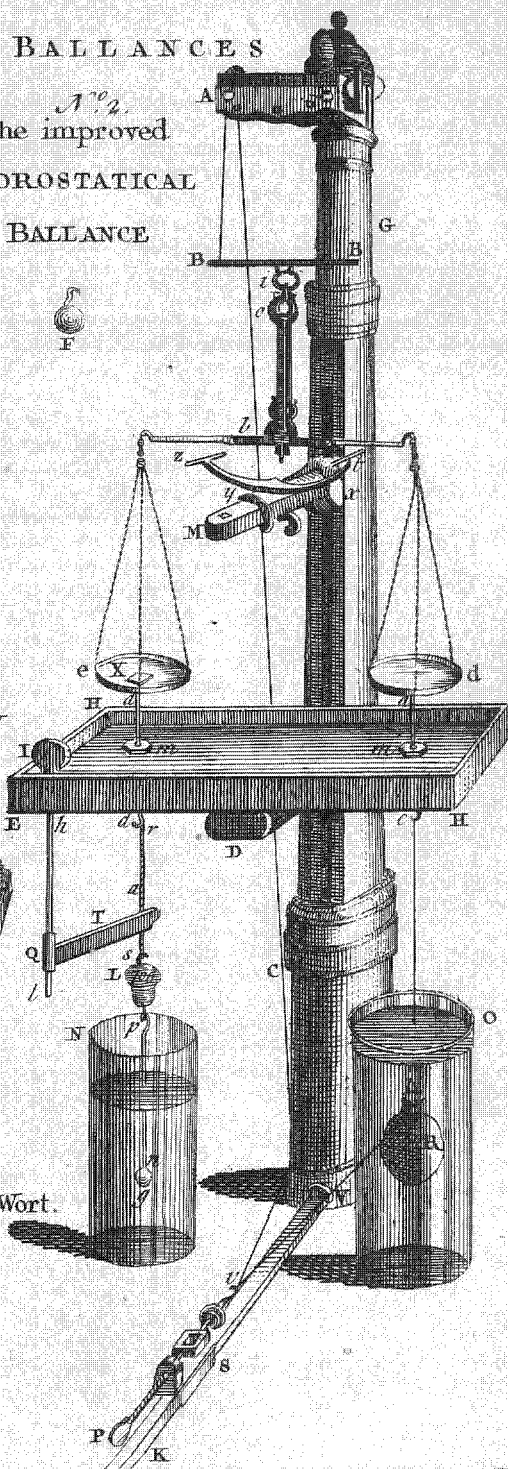
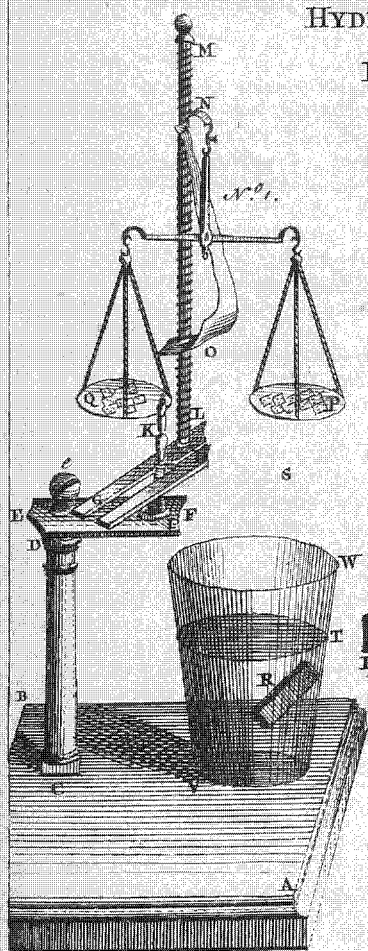
In the same manner, if divers solids are first weighed in air, and then afterwards immersed in the same fluid, as water, for instance, the equilibrium will be destroyed ; which will be restored, as before, by putting in so much weight as is equal to the weight of the same bulk of water : the gravity, therefore, of every solid is thus compared with water, and consequently with each other.

But in this, and many other cases, it is required to be very exact in weighing bodies, even beyond what is attainable by the nicest mechanism of this instrument.

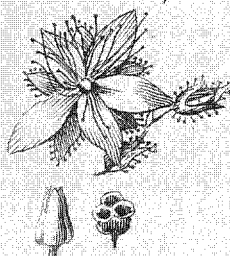


*Fig. 1.*  
HYDROSTATICAL BALLANCES

*N<sup>o</sup> 2.*  
The improved  
HYDROSTATICAL  
BALLANCE



*Fig. 2.* HYPERICUM, S<sup>t</sup> John's Wort.





ment. We shall therefore give the reader an account of an improvement of the common ballance in this respect; and it is the more pertinent in this place, as this instrument serves equally for exactness in common as in hydrostatical matters.

The figure of the machine represents the ballance in its hydrostatic use, *ibid.* n<sup>o</sup> 2. We shall first describe the machine, then shew the new contrived artifice for exactness; and, lastly, give an instance of its universal use. VCG is the stand or pillar fixed in the table. From the top at A hangs, by two silk strings, the horizontal piece or bar BB; from which is suspended, by a ring at *i*, the fine beam of a ballance *b*, which is kept from descending too low on either side by the gentle springing piece *txyz*, fixed on the supporter M. The harness is annulated at *o*, to shew distinctly the perpendicular position of the examen, by the small pointed index fixed above it.

The strings by which the ballance is suspended passing over two pullicies, one on each side the piece at A, go down to the bottom on the other side, and are hung over the hook at *v*; which hook, by means of a screw P, is moveable about  $1\frac{1}{4}$  inches backwards and forwards, and therefore the ballance may be raised or depressed so much. But if a greater elevation or depression be required, the sliding piece S, which carries the screw P, is readily moved to any part of the square brass-rod VK, and fixed by means of a screw.

The motion of the ballance being thus provided for, the rest of the apparatus is as follows: HH is a small table fixed upon a piece D, under the scales *d* and *e*, and is moveable up and down in a long slit in the pillar above C, and fastned at any part with a screw behind. At the point in the middle of the bottom of each scale is hung by a fine hook a brass-wire *ad, ac*. These pass through two holes *m, m* in the table; and to the wire *ad* is suspended a curious cylindric wire *rs*, perforated at each end for that purpose. This wire *rs* is covered with paper graduated by equal divisions, and is about five inches long.

In the corner of the table at E, is fixed a brass-tube in which a round wire *bl* is so adapted as to move neither too hard nor too freely by its flat head I. Upon the lower part of this moves another tube Q, which has friction enough to cause it to remain in any position required; to

this is fixed an index T, moving horizontally when the wire *bl* is turned about, and therefore may be easily set to the graduated wire *rs*.

To the lower end of the wire *rs* hangs a weight L, and to that a wire *pn* with a small brass ball *g*, about  $\frac{1}{4}$  of an inch in diameter. On the other side, to the wire *ac*, hangs a large glass bubble R by a horse-hair. Let us at present suppose the weight L taken away, and the wire *pn* suspended from S: and on the other side let the bubble R be taken away, and the weight F suspended in its room at *c*. This weight F we suppose to be such as will keep in equilibrio with the several parts appended to the other scale, at the same time that the middle point of the wire *pn* is in the surface of the water in the vessel N. The wire *pn* is to be of such a size, that the length of one inch shall weigh four grains. Hence it is evident, since brass is eight times heavier than water, that for every inch the wire sinks in the water, it will become half a grain lighter, and half a grain heavier for every inch it rises out of the water: consequently, by sinking two inches below the middle point, or raising two inches above it, the wire will become one grain lighter or heavier. And therefore, if when the middle point is at the surface of the water in equilibrio, the index T be set to the middle point *a* of the graduated wire *rs*, and the distance on each side *ar* and *as* contain a hundred equal parts; then, when in weighing bodies the weight is desired to the hundredth part of a grain, it may be easily had by proceeding in the following manner.

Let the body to be weighed be placed in the scale *d*, and put the weight X in the scale *e*; and let this be so determined, that one grain more shall be too much, and one grain less too little. Then the ballance being gently moved up or down by the screw P, till the equilibrium be nicely shewn at *o*; and then if the index T be at the middle point *a* of the wire *rs*, it shews that the weights put into the scale *e*, are just equal to the weight of the body. By this method we find the absolute weight of the body; the relative weight is found by weighing it hydrostatically in water, as follows.

Instead of putting the body into the scale *e*, as before, let it be appended with the weight F at the hook *c*, by a horse-hair as at R, supposing the vessel of water O

were away ; then the equilibrium being made, the index T standing between *a* and *r*, at the 36th division, shews the weight of the body put in 1095.36 grains. As it thus hangs, let it be immersed in the water of the vessel O, and it will become lighter by much ; the scale *e* will descend till the beam of the balance rests on the supporter *z*. Then suppose 100 grains put into the scale *d* restores the equilibrium precisely, so that the index T stands at the 36th division above *a* ; it is plain the weight of an equal bulk of water would, in this case, be exactly 100 grains.

After a like manner may this balance be applied to find the specific gravities of fluids, which will not be difficult from what has been said.

*Bradford's new HYDROSTATICAL INSTRUMENT*, a new invention for weighing coin, and discovering its defect either of weight or purity.

It consists of a thin, flat, brass-ruler, about half a foot long ; on each side of which are two graduated lines, those on the upper side being marked A and W (plate CXXXIX. fig. 1. n° 1.) and those on the under side B and W, *ibid.* n° 2. There is also a small chain and pincers wherein to fix any piece of money intended to be weighed and proved ; together with two pair of center-pins, marked A and B, *ibid.* n° 2 and 3, whereof the former pair A are to be used for proving all pieces of gold not exceeding the value of 36 s. and the other pair marked B, for all pieces from 36 s. to 72 s. or 3 l. 12 s. Lastly, there is a sliding-piece or index C, (*ibid.* n° 3.) by the motion of which backwards and forwards upon the ruler, the value of any piece suspended in the pincers is found upon the graduated lines already mentioned ; whereof those marked A and B are called *statical* lines, as being calculated for weighing the piece in air ; and those marked W, W, are called *hydrostatical* lines, as serving to point out the alloy or adulteration of the piece weighed. A whole division on each line, is equal to the weight or value of 1 s. in gold ; a half division to 6 d. and a quarter division to 3 d.

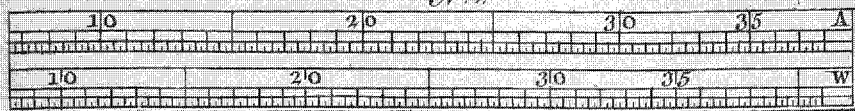
To prove a guinea: first suspend it in the pincers, and then placing the inside of the sliding-piece C to 21 on the line A, on the upper side of the ruler, which must move freely on the center-pins marked A ; and if the guinea and sliding-piece exactly ballance each other, the

guinea is full weight : if not, move the slider backward or forward, till they equiponderate, and the division cut by the inside of the slider is the true weight ; for instance, suppose it rests at 20  $\frac{1}{2}$ , then does the guinea weigh only 20 s. 6 d. In the next place, to prove the alloy of this piece, let the slider be brought to the division 20  $\frac{1}{2}$  upon the hydrostatical line marked W ; for whatever division is cut by the slider, in weighing on the statical line, it must be placed at the same on the hydrostatical line adjoining. Then let the piece, together with the pincers, and the brass-link whereon it is suspended, be immersed in water, (*ibid.* n° 3.) as far as the notch in the said link ; and if the instrument acts in equilibrio, or the piece sink deeper in the water, the guinea is standard-gold : but if the slider must be moved farther backward before it will equiponderate, the guinea is adulterated. If alloyed with silver, allow 2 s. for every penny it wants in the hydrostatical weight ; and then, if the number of pence the piece is deficient in weight hydrostatically, when doubled, exceed the number of shillings it weighs statically, you may conclude it is adulterated with some baser metal than silver. However, a more speedy method of discovering whether a piece of gold be adulterated or not, without moving the slider more than once, is this : when you have weighed a piece statically, bring the slider to the division on the hydrostatical line expressing its weight ; and immersing the piece and pincers as before, so that the surface of the water may be exactly at the notch or mark on the long link, if the instrument doth not then equiponderate, gently lower your hand that holds the fluid till the instrument comes to an equilibrium ; at which time, if the guinea be a counterfeit, great part of the pincers will appear above water ; and if a 36 s. piece be tried, not only the pincers, but a small part of the coin will appear above the surface, if the piece be counterfeit. This last method is sufficiently near the truth for common practice.

If you should have occasion to weigh and prove a very small piece of gold, as 2 s. 3 d. or 4 s. 6 d. the method is to put the said piece in the pincers with some other piece that has been proved before ; by which means, the weight and alloy of the small piece may be easily discovered, as above. And if the piece be  
above

Fig. 1. BRADFORD'S HYDROSTATIC INSTRUMENT.

N<sup>o</sup> 1.



N<sup>o</sup> 2.

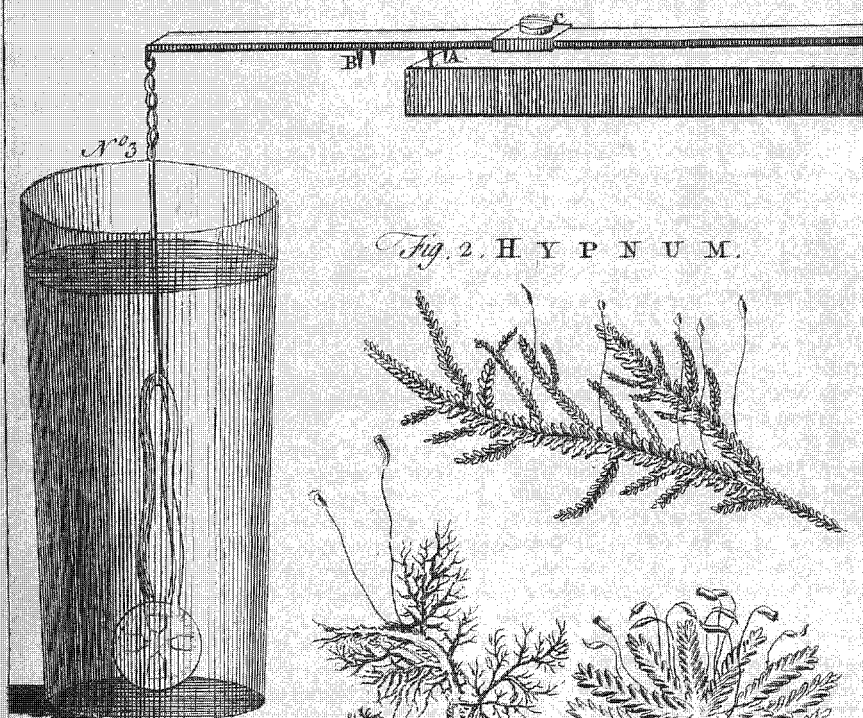
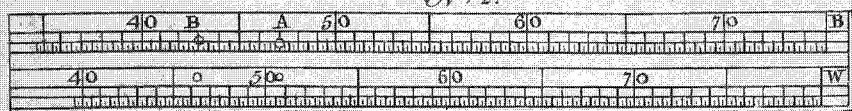


Fig. 2. HYPNUM.

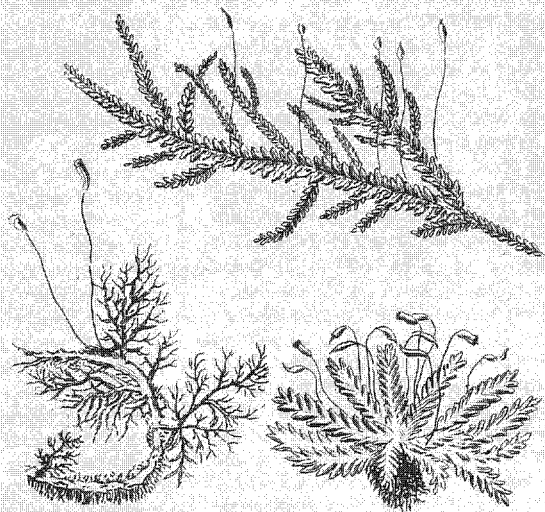


Fig. 3. H Y S S O P.





above 36 s. then the slider is to be placed according to the divisions of the statical and hydrostatical lines on the under side of the instrument; which is fitted to the standard of the mint, that makes the guinea to weigh 129 grains.

**HYDROSTATICS**, that part of philosophy which treats of the nature, gravity, and pressure of fluids, all which have been explained and illustrated under the article FLUID.

The application of hydrostatics to the several uses of life, will be evident from the following instances. Having first premised that a cubic foot of common water weighs nearly 1000 ounces averdupois, or 62 pounds and a half, which may be reduced to troy-weight by considering that the averdupois pound is to the troy pound as 17 to 14, and the averdupois ounce to the troy ounce, as 51 to 56. Hence to find the quantity of pressure against a sluice or bank that pens the water, we have this rule: multiply the area of the sluice under water by the depth of the center of gravity in feet, and the product again by  $62\frac{1}{2}$ ; this last product will be the number of pounds required. Example: admit the length of a sluice to be 20 feet, and the depth of the water 5, then will the area under water be 100 square feet; which multiplied by  $2\frac{1}{2}$ , the depth of the center of gravity, gives 250 cubic feet; which again multiplied by  $62\frac{1}{2}$ , gives 15625 lb. equal to 7 tons nearly.

Again; since the weight of bodies is always as the specific gravities in equal bulks, it follows that the numbers in the table of specific gravities, do also express the number of averdupois ounces contained in a cubic foot of each respective sort of matter therein mentioned. See the article GRAVITY.

Therefore, if the magnitude of any body be multiplied by the specific gravity, the product will be its absolute weight.

Another useful hydrostatic problem, is to find the magnitude of any thing when the weight is known; which is done by dividing the weight by the specific gravity, and the quotient is the magnitude sought. Also by knowing the magnitude and weight, we can find the specific gravity by dividing the weight of the magnitude in cubic feet.

Having found by the hydrostatic balance the specific gravity of gold to silver as 19 to 11, and supposing any compound thereof, as Hiero's crown, whose speci-

fic gravity is 16, to determine the proportion and weight of the gold and silver employed in making it, say, as the difference of the specific gravities of the compound and the lighter ingredient, *viz.* 5, is to the difference of the specific gravities of the heavier ingredient and the compound, *viz.* 3, so is the bulk of gold to that of silver made use of; that is, if the whole crown were divided in 8 parts, the gold would consist of 5, and the silver of 3: then the magnitudes 5 and 3 multiplied by the specific gravities 19 and 11, severally, will give the numbers 95 and 33, which express the proportion of the gold to that of the silver. See HYDROSTATIC BALANCE. But how great the usefulness and importance of hydrostatic knowledge is to physicians, chemists, apothecaries, jewellers, goldsmiths, &c. will appear by reading Mr. Boyle's excellent *Medicina Hydrostatica*, in which book the skilful author proposes the following uses to be made of hydrostatic knowledge, *viz.*

1. To explore the nature and difference of fossils, by finding their specific gravities. For since the most pure and homogeneous kinds of stones are in gravity to water as about  $2\frac{1}{2}$  to 1, and tin, the lightest of metals, is to water in gravity as about 7 to 1, if a stony substance be found to have a greater proportion of gravity than that of  $2\frac{1}{2}$  to 1, it must be probable that it has in it some adventitious matter of a metalline nature; or is at least commixed with some mineral body more heavy than pure stone, and may therefore very probably be usefully applied to some medicinal purposes. As instances of this kind, he mentions the lapis hæmatites, lapis lazuli, and lapis calaminaris, all which have their uses in physic.

2. He proposes this method as very certain to determine whether a body, supposed to be a stone of the mineral kind, be so indeed. Thus corn which, says he, some take to be a plant, and others a lithodendron, but most reckon it among precious stones, is in gravity to water as 2,68 to 1, which favours the last opinion: thus a calculus humanus and a bezoar were found as 1,7 and 1,5 to 1; and therefore too light, to be of the same species with the common stone.

3. A third use which he proposes is to discover the resemblance or difference between bodies of the same denomination, and thereby to collect and ascertain their

several degrees of goodness respectively. Whence he argues the necessity of this sort of knowledge to physicians, chemists, apothecaries, druggists, to the goldsmith, the merchant, the miner, &c.

4. A fourth use is to discern genuine stones from counterfeit ones, which may be of great help to jewellers: here he gives instances of factitious coral, and factitious gems, and a bezoar, which he found out that way not to be genuine, tho' a great price was set on the latter.

5. Hence mercury is said to have a different gravity, being sometimes  $13 \frac{1}{2}$ , and sometimes above 14 times heavier than water; and hence a notable difference may arise in weather glasses at the same time, and in the same place, even to a whole inch, from the different gravity of the mercury in the one and in the other: therefore, those who publish registers of the weather, ought to find out and declare to the world the specific gravity of the quicksilver they use in their barometers.

6. These he enumerates over and above what we have taken notice of a mechanical and geometrical nature, and to let us know the high value he had for this science, he expresses himself thus: "As little skill as I have in hydrostatics, I would not be debarred from the use of them for a considerable sum of money; it having already done me acceptable service, and on far more occasions than I myself at first expected, especially in the examen of metals, and mineral bodies, and of several mineral productions," with much to the same purport.

**HYDROTICS**, among physicians, signify medicines more usually called sudorifics. See the article **SUDORIFICS**.

**HYGIENE**, from *hygieia*, health, that part of medicine which prescribes rules for the preservation of health; which depends, in a great measure, on the prudent use of the non-naturals, air, diet, exercise, sleep, passions of the mind, retention and excretions. See **AIR**, **DIE T**, **EXERCISE**, &c.

**HYGROMETER**, a machine, or instrument whereby to measure the degrees of driness, or moisture of the air, or rather of the atmosphere. See the articles **AIR**, and **ATMOSPHERE**.

There are divers sorts of hygrometers; for whatever body either swells or shrinks, by dryness or moisture, is capable of being formed into an hygrometer. Such are woods of most kinds, particularly

ash, deal, poplar, &c. Such also is catgut, the beard of a wild oat, &c. Stretch an hempen cord or lute-string, as A B. (plate CXL. n<sup>o</sup> 1.) along a wall, bringing it over a pulley, B; and to the other end D, fix a weight E; into which fit an index G. On the same wall fit a plate of metal HI, divided into any number of equal parts, and the hygrometer is complete. For it is known from experience that moisture sensibly shortens the length of cords or fiddle-strings; and that as the moisture evaporates, they return to their former length. The weight, therefore in the present case, upon an increase of the moisture of the air, will ascend; and upon a diminution of the same, it will descend.

Hence, as the index G will shew the spaces of ascent and descent; and those spaces are equal to the increments and decrements of the length of cord, or gut, A B D; the instrument will discover whether the air be more or less humid now, than it was at another given time.

But if a more sensible and accurate hygrometer be required, strain a whip-cord or fiddle-string, over several pulleys B, C, D, E, F, and G. (*ibid.* n<sup>o</sup> 2.) and proceed as in the former example. Nor does it matter whether the several parts of the cord A B, B C, C D, &c. be parallel to the horizon as expressed in the figure or perpendicular to the same.

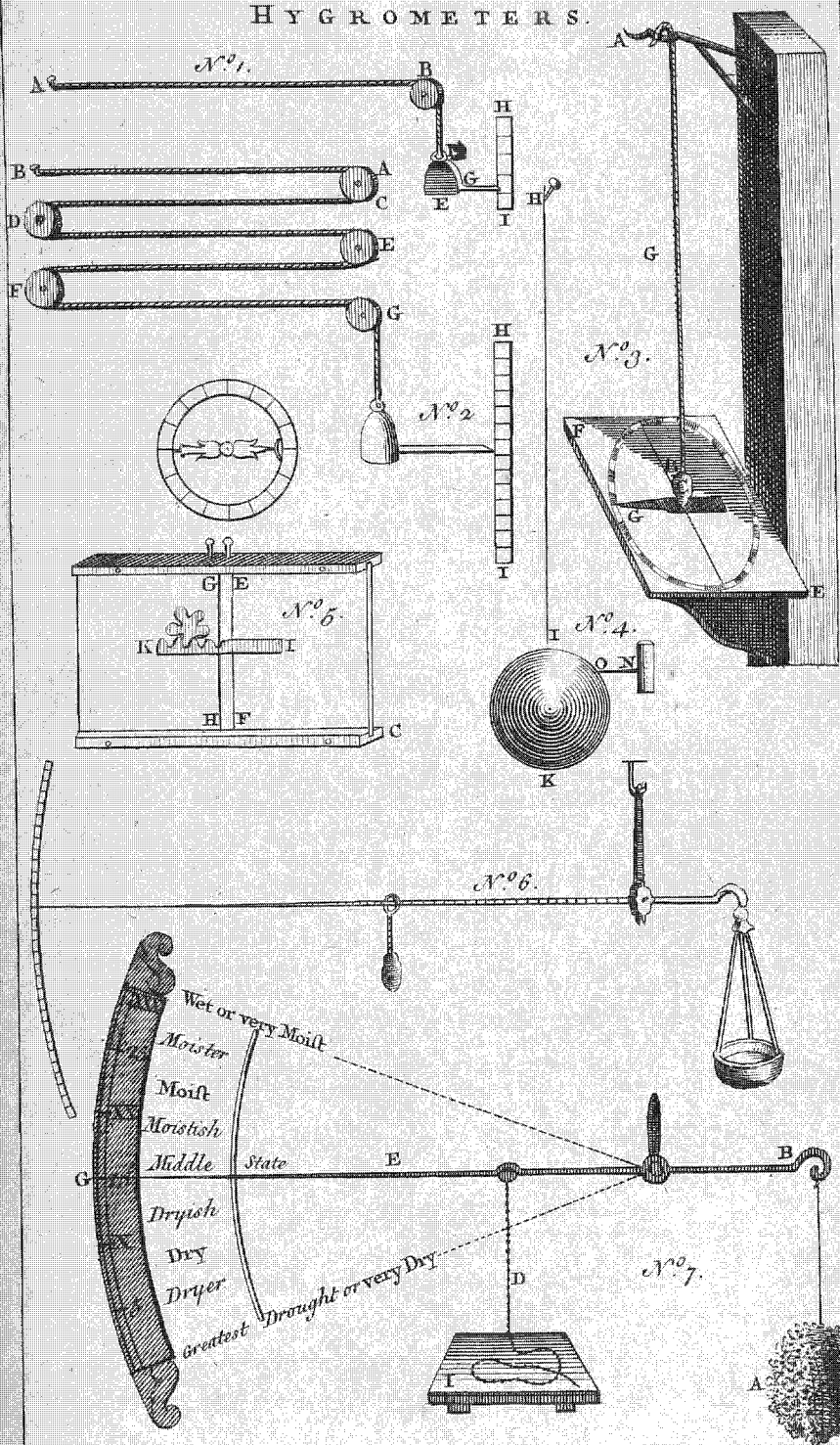
The advantage of this above the former hygrometer, is, that we have a greater length of cord in the same compass; and consequently greater contraction or dilatation.

Another method of construction, which is more simple, is thus. Fasten a hempen cord or fiddle-string, A B, (*ibid.* n<sup>o</sup> 3.) to an iron-hook; and let the other end, B, descend upon the middle of a horizontal board, or table, E F; near B, hang a leaden weight or ball of a pound, C, and fit an index C G. Lastly, from the center B describe a circle, which divide into any number of equal parts. Or, instead of the table or board, draw two concentric circles on the ball K from I, (n<sup>o</sup> 4.) and divide them into any number of equal parts, and fix an index N O, to any proper support N. So that it may almost touch the divisions of the ball. Here the cord or gut twisting or untwisting will shew the change of moisture, &c. by the successive application of the index to the divisions of the circle.

Or thus: provide two wooden frames, A B



# HYGROMETERS.





AB and CD, (n<sup>o</sup>. 5.) with grooves therein; and between these grooves fit two thin leaves of ash, AEFC, and GBDH, so as they may easily slide either way. At the extremes of the frames A, B, C, D, confine the leaves with nails, leaving between them the space EGHF, about an inch wide. On I fasten a slip of brass dented, IK; and in L a little dented wheel, upon whose axis, on the other side of the machine an index is to be put. Lastly, from the center of the axis, on the same side, draw a circle, and divide it into any number of equal parts. Now, it is found from experience, that ash wood readily imbibes the moisture of the air, and swells therewith; and as that moisture slackens, shrinks again; upon any increase of the moisture of the air, the two leaves AF and BH growing turgid, will approach nearer each other: and, again, as the moisture abates, they will shrink, and again recede. Hence, as the distance can neither be increased nor diminished without turning the wheel L, the index will point out the changes in respect of humidity, or ficcidity. From this contrivance it was that Mr. Coniers in the Philosophical Transactions made the following observations for five or six years.

1. That the pannels will move by shrinking most in summer, and swelling most in winter; but will vary from this according to the change, to the then more or less heat or cold, moisture or drought, that the temper or season, such as spring or fall, do produce; it being then more apt to swell or shrink on the sudden, but not attaining then to the highest shrinking or swelling, as in summer and winter it doth. 2. That for the most part, especially in the spring and summer-time, this motion happens only in the day-time; for then generally all night it rests, and moves very seldom. 3. That one kind or manner of this motion happens in dry, fair weather, but sometimes in the forepart of the forenoon, and sometimes not until the latter part of the forenoon, and then at that time it relaxes or swells the deal for about two or three hours; more, seldom; less, often; and then all the afternoon after it shrinks; nay, sometimes even when a small rain hath newly fallen, or is then falling. 4. This shrinking is gradual very often, or for the most part a little after a moist time, viz. the first day after moisture it shrinks a little; the second,

more, and so yet more, according to the then season of the year, and as it is then inclined to moisture or drought, the alteration of the wind, and the heat or cold at that time. 5. The wind's being in the north, north-east, and east, winter and summer, for the most part at that time the deal shrinks, in the night also as well as in the day, but not so much; which is a sign of drying weather, and sometimes of frost or cold in winter, heat or scorching in summer, in a clear day. But on the contrary, the south wind's blowing, or the west and south-west, the deal always relaxes that day, or at least is at a stay, provided this happen in the day-time; for then if in the night, not so much; and so this will do some considerable time before rain. 6. By a constant observation of this instrument, you may be able to guess at the wind's situation without a weather-cock, provided you have by you a common and a sealed thermometer. 7. Also you may know the time of the year: for in the spring it moves quicker, and more in winter; in summer it is more shrunk than in the spring; in autumn less in motion than in summer.

It is to be observed, that all the hygrometers above described become by degrees less and less accurate, and at length undergo no sensible alteration at all from the humidity of the air.

The following is much more lasting. Take a nice balance (*ibid.* n<sup>o</sup>. 6.) and place in it a sponge, or other body, which easily imbibes moisture; and let it be in equilibrio, with a weight hung at the other end of the beam. Now if the air become moist, the sponge becoming heavier, will preponderate; if dry, the sponge will be raised up. This balance may be contrived two ways; by either having the pin in the middle of the beam, with a slender tongue a foot and a half long, pointing to the divisions on an arched plate fitted to it; or, the other extremity of the beam may be made so long as to describe a large arch on a board placed for the purpose, as is represented in the figure.

To prepare the sponge, it may be necessary to wash it in water; and when dry again, in water or vinegar, wherein sal armoniac, or salt of tartar, has been dissolved, and let it dry again, then it is fit to be used.

In the last mentioned hygrometer, Mr. Gould, in the Philosophical Transactions, instead

instead of a sponge, recommends, oil of vitriol, which is found to grow sensibly lighter or heavier, in proportion to the lesser or greater quantity of moisture it imbibes from the air; so that being saturated in the moistest weather, it afterwards retains or loses its acquired weight, as the air proves more or less moist. The alteration in this liquor is so great, that in the space of fifty-seven days, it has been known to change its weight from three drachms to nine; and has shifted an index or tongue of a balance thirty degrees. A single grain, after its full increase, has varied its equilibrium so sensibly, that the tongue of a balance, only an inch and a half long, has described an arch one third of an inch in compass, (which arch would have been almost three inches if the tongue had been one foot) even with so small a quantity of liquor; consequently, if more liquor, expanded under a large surface, were used, a pair of scales might afford as nice an hygrometer as any kind yet invented. The same author suggests, that oil of sulphur per campanum, or oil of tartar per deliquium, or the liquor of fixed nitre, might be substituted in lieu of the oil of vitriol.

But among all the inventions the following seems best calculated both for dispatch and accuracy. A (*ibid.* n<sup>o</sup> 7.) represents a thin piece of sponge, so cut as to contain as large a superficies as possible. This hangs by a fine thread of silk, upon the beam B, and is exactly balanced from another thread of silk at D, strung with the smallest lead shot, at equal distances, and so adjusted as to cause the index E to point at G, in the middle of the graduated arch F G H when the air is in a middle state between the greatest moisture and the greatest dryness. I, shews a little table or shelf for that part of the silk and shot which is not suspended to rest upon.

**HYLE**, or **HYLEC**, among alchemists, denotes their first matter, or the original chaos of things.

**HYLEG**, or **HYLECH**, in astrology, signifies a planet, or the point in the heavens which at a person's nativity, is accounted the significator of life. See **NATIVITY**.

**HYMEN**, in anatomy, a membrane, sometimes of a circular, sometimes of a semilunar figure, and sometimes of a form different from both. It is always found in young girls, and stops a part of the vagina. In these it has a small aperture,

and a longer in adults who have not conversed with men. After the first coitus it is not to be found: it is always destroyed by it, and if it has not been injured before, some blood always follows the rupture of it.

In the heathen mythology, Hymen was the god of marriage, and new-married women offered sacrifices to this deity. He was represented crowned with sweet marjoram, and sometimes with roses; carrying in one hand a torch, and in the other a flame-coloured veil, to represent the blushes of a virgin.

**HYMENÆA**, in botany, a genus of the *polygamia triœcia* class of plants, the flower of which is papilionaceous, and its fruit a large legumen or pod, of an ovato-oblong figure, obtuse, and unilocular, with numerous oval seeds, surrounded with fibres and a farinaceous matter.

**HYMENÆAL**, something belong to marriage, so called from hymen. See the articles **HYMEN** and **MARRIAGE**.

The hymenæal song is otherwise called epithalamium. See **EPITHALAMIUM**.

**HYMN**, a religious song. The hymns sung in the christian church, as distinguished from the psalms, are pieces of poetry composed by pious, but not inspired authors.

The use of music in religious worship has prevailed in all nations from the remotest ages. The ancient heroes were of opinion, that it appeased the anger of the gods, for which reason their public devotion was generally attended with a concert of voices and instruments.

Music has likewise been consecrated to religion, both by the Jews and Christians; and the former made use of trumpets, drums and cymbals, joined with the voices of the levites and people: but the music of the ancient christians was plain and solemn, and consisted only in singing hymns, or psalms, with joint voices.

The priscillianists pretended to shew, among their apocryphal writings, the hymn which our blessed Lord sung with his disciples, after his last supper. But it is generally supposed, that they sung the hymn which the Jews were used to sing after eating the passover.

**HYOIDES**, in anatomy, a bone which adheres to the base of the tongue.

In young subjects the os hyoides is composed of three bones, a base, occupying its middle part, and two lateral ones, called its horns. In adults there are often,

overlooked

at the junctures of these with the base, two other frustæ, very small, and thence overlooked by most writers : these are nearly of the shape of a wheat-corn, and may therefore be called *ossa triticea* : there are ligaments fixed to these, by means of which they adhere to the styloide processes. And, finally, in these ligaments themselves, sometimes, tho' very rarely, there are found some other little bones. Vesalius met with six of these ; and some others after him have reckoned eleven bones to the formation of the *os hyoides*. The use of the *os hyoides* is to give a firm basis to the tongue : and therefore several muscles of the tongue and larynx, serving to the necessary motions of both, are inserted into it.

**HYOSCYAMUS**, **HEN-BANE**, in botany, a genus of the *pentandria monogynia* class of plants, the flower of which consists of a single infundibuliform petal, with a short cylindrical tube, and an erectopatent limb lightly divided into five obtuse segments, one of which is broader than the rest : the fruit is a capsule of an ovato-obtuse figure, with a line marked on each side ; it contains two cells, with numerous seeds.

The root of this plant, according to Dale, is an excellent refrigerant and emollient, but is said to occasion madness ; for which reason, it is very rarely used internally. Its seeds are recommended in an hæmoptysis, and hæmorrhages ; but those of the white henbane are said to be much milder and safer.

**HYOTHYROIDES**, in anatomy, a muscle of the larynx, which serves to raise it, and constrict the glottis.

**HYPÆTHROS**, or **HYPÆTHRON**, in antient architecture, a kind of temple open at the top.

Vitruvius says, it was an open building or portico, which had no roof or covering, as the temple of Jupiter Olympius, built by Cassatius, a roman architect at Athens.

**HYPALLAGE**, among grammarians, a species of hyperbaton, consisting in a mutual permutation of one case for another. Thus, Virgil says, *dare classibus auro*, for *dare classes auro* ; and again, *necdum illis labra admovi*, for *necdum illa labris admovi*.

**HYPANTE**, or **HYPERPANTE**, a name given by the Greeks to the feast of the presentation of Jesus in the temple.

This word, which signifies lowly or humble meeting, was given to this feast,

from the meeting of old Simon and Anna the prophets in the temple, when Jesus was brought thither.

**HYPATE**, in antient music, an appellation given to the lowest chord of a tetrachord. Thus hypate hypaton, was the lowest chord of the hypaton tetrachord, and answered to our B natural of the lowest octave of the organ ; or to the lowest *mi* of Guido's scale. The hypate meson was the last note of the hypaton, and the first of the meson tetrachord. See the article **DIAGRAM**.

**HYPECOUM**, *wild CUMIN*, in botany, a genus of the *tetrandria-digynia* class of plants, the corolla whereof consists of four petals ; the two exterior petals are broad, trilobated, and obtuse, and are placed over-against one another ; the two interior ones stand alternately with the others ; they are lightly divided into three segments, of which the middle one is hollow, compressed, and erect : the fruit is a long, compressed pod, incurved, and articulated : the seeds are of a roundish figure, but compressed, and are placed singly in the articulations of the pod.

This plant is an opiate.

**HYPER**, *ὑπερ*, a greek preposition, frequently used in composition, where it denotes excess ; its literal signification being above, or beyond.

**HYPERBATON**, in grammar, a figurative construction inverting the natural and proper order of words and sentences. The several species of the hyperbaton are the anastrophe, the hysteron-proteron, the hypallage, synchysis, tmesis, parenthesis, and the hyperbaton, strictly so called. See **ANASTROPHE**, &c.

**HYPERBATON**, strictly so called, is a long retention of the verb, which completes the sentence, as in the following example from Virgil.

*Interea reges : ingenti mole Latinus  
Quadrifugo vehitur curru, cui tempora  
circum*

*Aurati bis sex radii fulgentia cingunt,  
Solis avi specimen : bigis it Turnus in albis,  
Bina manu lato crispans hastilia ferro :  
Hinc pater Æneas Romanæ stirpis origo,  
Sidereo flagrans clypeo & cælestibus armis ;  
Et juxta Ascæus magnæ spes altera Romæ :  
Procedunt castris.*

**HYPERBOLA**, in geometry, the section **GEH** (Plate **CXLI**. n.º 1.) of a cone **ABC**, made by a plane, so that the axis, **EF**, of the section inclines to the opposite leg of the cone, **BC**, which in the parabola is parallel to it, and in the ellipse

ellipsis intersects it. The axis of the hyperbolic section will meet also with the opposite side of the cone, when produced above the vertex, at D.

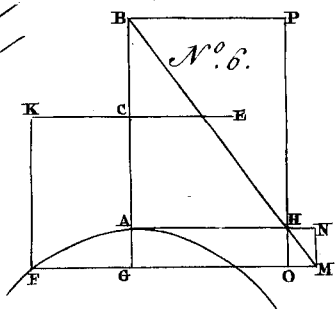
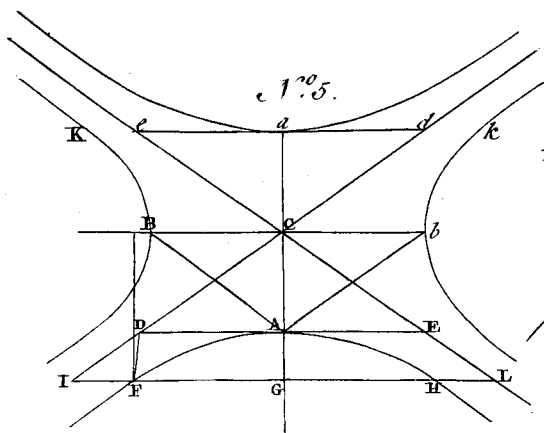
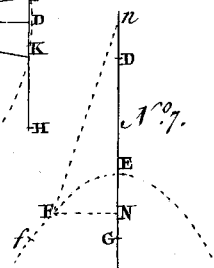
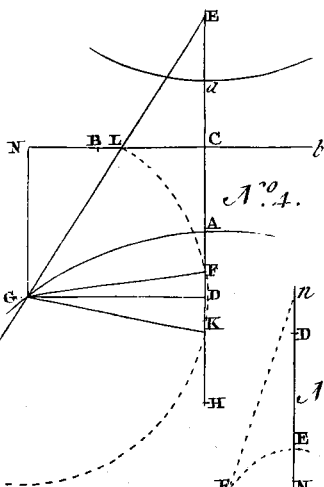
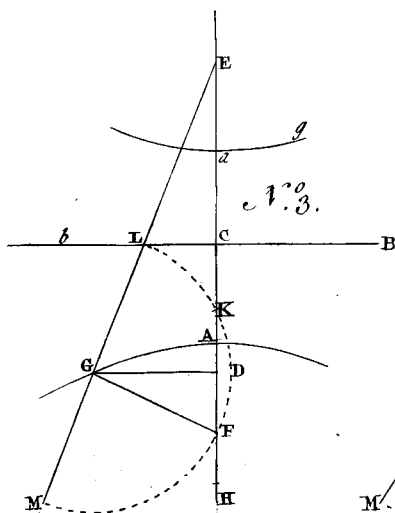
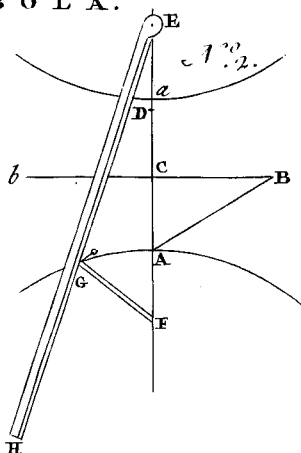
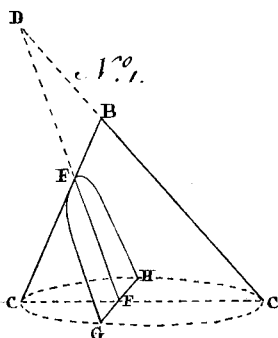
Definitions. 1. If at the point E (*ibid.* n<sup>o</sup> 2.) in any plane, the end of the rule EH be so fixed, that it may be freely carried round, as about a center; and at the other end of the rule H there is fixed the end of a thread shorter than the rule, and let the other end of the thread be fixed at the point F in the same plane; but the distance of the points EF must be greater than the excess of the rule above the length of the thread; then let the thread be applied to the side of the rule EH by the help of a pin G, and be stretched along it; afterwards let the rule be carried round, and in the mean time let the thread kept stretched by the pin be constantly applied to the rule: a certain line will be described by the motion of the pin, which is called the hyperbola. But if the extremity of the same rule, which was fixed in the point E, is fixed in the point F, and the end of the thread is fixed in the point E, and the same things performed as before; there will be described another line opposite to the former, which is likewise called an hyperbola; and both together are called opposite hyperbolas. These lines may be extended to any greater distance from the points E, F, *viz.* if a thread is taken of a length greater than that distance. 2. The points E and F are called the foci. 3. And the point C, which bisects the right line betwixt the two focus's, is called the center of the hyperbola, or of the opposite hyperbolas. 4. Any right line passing thro' the center, and meeting the hyperbolas, is called a transverse diameter; and the points in which it meets them, their vertices: but the right line, which passes thro' the center, and bisects any right line terminated by the opposite hyperbola's, but not passing thro' the center, is called a right diameter. 5. The diameter which passes thro' the foci, is called the transverse axis. 6. If from A or a, the extremities of the transverse axis, there is put a right line AD equal to the distance of the center C from either focus, and with A, as a center, and the distance AD, there is a circle described, meeting the right line, which is drawn thro' the center of the hyperbola at right angles to the transverse axis, in B b; the line B b, is called the second axis. 7. Two di-

ameters, either of which bisects all the right lines parallel to the other, and which are terminated both ways by the hyperbola or opposite hyperbolas, are called conjugate diameters. 8. Any right line not passing thro' the center, but terminated both ways by the hyperbola or opposite hyperbolas, and bisected by a diameter is called an ordinate applied, or simply an ordinate to that diameter: the diameter likewise, which is parallel to that other right line ordinately applied to the other diameter, is said to be ordinately applied to it. 9. The right line which meets the hyperbola in one point only, but produced both ways falls without the opposite hyperbolas, is said to touch it in that point, or is a tangent to it. 10. If thro' the vertex of the transverse axis a right line is drawn equal and parallel to the second axis, and is bisected by the transverse axis, the right lines drawn thro' the center and the extremities of the parallel line are called asymptotes. 11. The right line drawn thro' the center of the hyperbola, parallel to the tangent, and equal to the segment of the tangent betwixt the asymptotes, and which is bisected in the center, is called the second diameter of that which is drawn thro' the point of contact. 12. A third proportional to two diameters, one of which is the transverse, the other second to it, is called the *Latus rectum*, or parameter of that diameter, which is the first of the three proportionals. And, 13. Lastly, n<sup>o</sup> 5. If upon two right lines A a, B b, mutually bisecting each other at right angles, the opposite hyperbolas AG, ag are described; and if upon the same right lines there are described two other opposite hyperbolas BK, bk, of which the transverse axis B b, is the second axis of the two first; and the second axis of the two last, A a, is the transverse axis of the two first; these four are called conjugated hyperbolas, and their asymptotes shall be common.

Prop. I. (*ibid.* n<sup>o</sup> 2.) The square of the half of the second axis is equal to the rectangle contained by the right lines betwixt the foci and the vertex's of the transverse axis.

Let A a be the transverse axis, C the center, E and F the foci, and B b the second axis, which is evidently bisected in the center C, from the definition; let A B be joined: then since (by def. 6.) A B and C F are equal; the squares of

# HYPERBOLA.







AC and CB together will be equal to the square of CF, that is, (6. 2.) to the square of AC and the rectangle A Fa together; wherefore taking away the square of AC which is common, the square of CB will be equal to the rectangle A Fa.

Prop. II. If from any point G (*ibid.* n° 3, 4.) of the hyperbola, a right line GD is drawn at right angles to the transverse axis Aa, and if from the same point there is drawn the right line GF to the focus nearest to that point; the half of the transverse axis CA will be to the distance of the focus from the center, *viz.* CF, as the distance of the perpendicular CD, is to the sum of the half of the transverse axis, and the right line drawn to the focus.

Let GE be drawn to the other focus, and on the axis aA produced, let there be set off AH equal GF; then with the center G, and the distance GF, describe a circle cutting the axis aA in K and F, and the right line EG in the points L and M: then since EF is double CF, and FK double FD, EK shall be also double CD; and since EL or Aa, is double CA, and LM double GF or AH, EM shall also be double CH: but because of the circle EL or Aa: EF::EK:EM: and taking their halves, it will be as CA:CF::CD:CH.

Prop. III. (*ibid.* n° 3, 4.) the same things being supposed, if from A the extremity of the transverse axis nearest to the point G, there is set off a right line AH on the axis produced, equal to the distance of the point G from the focus F, nearest to the said extremity; the square of the perpendicular GD shall be equal to the excess of the rectangle EHF, contained under the segments betwixt H (the extremity of the right line AH) and the foci, above the rectangle ADa contained under the segments cut off betwixt the perpendicular and the extremities of the axis.

For since the right line CH is any how cut in A, the squares of CA and CH together will be equal to twice the rectangle ACH, and the square of AH, (7. 2.) *i. e.* because CA, CF, CD, CH are proportionals, to twice the rectangle FCD, and to the square of AH or GF; that is, to twice the rectangle FCD and the squares of FD and DG, that is, to the squares of FC, CD, and DG, (7. 2.) wherefore the two squares of CA and

CH are equal to the three squares of FC, CD, and DG; and taking away the squares of CA and CF from both sides, the remaining rectangle EHF, will be equal to the remaining rectangle ADa, and to the square of DG (6. 2.)

Prop. IV. (*ibid.* n° 3, 4.) If from any point G of the hyperbola, there is drawn a right line parallel to the second axis Bb, meeting the transverse axis Aa in D; the square of the transverse axis shall be to the square of the second axis, as the rectangle contained under the segments of the transverse axis betwixt the parallel and its extremes, to the square of the parallel.

Prop. V. (*ibid.* n° 4.) If from any point G of the hyperbola there is drawn a right line parallel to the transverse axis Aa, meeting the second axis in N; the square of the second axis, shall be to the square of the transverse, as the sum of the squares of the half of the second axis and its segment betwixt the center and the right line, to the square of the line itself; that is,  $CB^2:CA^2::CB^2+GD^2:CA^2+$  the rectangle ADa; that is, as  $CB^2+CN^2$  is to  $CD^2$  or  $GN^2$ .

Prop. VI. (*ibid.* n° 5.) It is another property of the hyperbola, that the asymptotes, Dd, Ee, do never absolutely meet with the curve. See ASYMPTOTE.

Prop. VII. If through any point F (*ibid.* n° 5.) of the hyperbola, there is drawn a right line IFL parallel to the second axis, and meeting the asymptotes in I and L; the rectangle contained under the right lines which are intercepted betwixt the asymptotes and the hyperbola, is equal to the square of the half of the second axis, that is,  $CB^2=IFL=IHL$ .

Prop. VIII. (*ibid.* n° 6.) If from any point F of the hyperbola, there is drawn to the transverse diameter, AB, a right line ordinately applied to it FG; and from the extremity of the diameter there is drawn AH perpendicular to it, and equal to the *latus rectum*; the square of the ordinate shall be equal to the rectangle applied to the *latus rectum*, being of the breadth of the abscissa betwixt the ordinate and the vertex, and which exceeds it by a figure like and alike situated to to that which is contained under the diameter and the *latus rectum*.

For join BH, and from the point G let there be drawn CM parallel to AH, and meeting BH in M, and through M let there be drawn MN parallel to AB meeting AH in N, and let the rectangle

MNHO, B AHP, be completed. Then since the rectangle AGB, is to the square of GF, as AB is to AH, *i. e.* as GB is to GM, *i. e.* as the rectangle AGB is to the rectangle AGM; AGB shall be to the square of GF, as the same AGB to the rectangle AGM: wherefore the square of GF is equal to the rectangle AGM, which is applied to the *latus rectum* AH, having the breadth AG, and exceeds the rectangle HAGO, by the rectangle MNHO, like to B AHP; from which excess the name of hyperbola was given to this curve by Apollonius.

Prob. I. n° 7. An easy method to describe the hyperbola, having the transverse diameter DE, and the foci N, *n* given. From N, at any distance, as NF, strike an arch; and with the same opening of the compasses with one foot in E the vertex, set off EG equal NF in the axis continued; then with the distance GD, and one foot in *n*, the other focus, cross the former arch in F. So F is a point in the hyperbola: and by this method repeated may be found any other point *f*, further on, and as many more as you please.

An asymptote being taken for a diameter; divided into equal parts, and through all the divisions, which form so many abscissæ continually increasing equally, ordinates to the curve being drawn parallel to the other asymptote; the abscissæ will represent an infinite series of natural numbers, and the corresponding hyperbolic, or asymptotic spaces, will represent the series of logarithms of the same numbers. See LOGARITHM.

Hence different hyperbolas will furnish different series of logarithms; so that to determine any particular series of logarithms, choice must be made of some particular hyperbola. Now the most simple of all hyperbolas is the equilateral one, *i. e.* that whose asymptotes make a right angle between themselves.

For the locus of any hyperbola. See the article LOCUS.

For the quadrature of the hyperbola. See the article QUADRATURE.

Ambigonal hyperbola is that which has one of its infinite legs inscribed, and the other circumscribed.

Equilateral hyperbole is that wherein the conjugate axes are equal.

Apollonian hyperbola is the common hyperbola, or the hyperbola of the first kind; thus called in contradistinction

to the hyperbolas of the higher kinds, or infinite hyperbolas: for the hyperbola of the first kind, or order, has two asymptotes; that of the second order has three; that of the third, four, &c.

HYPERBOLÆON, in antient music, the upper or last tetrachord or fourth.

It was thus called from its being high or shrill, when compared with the other fourths. It was conjoint to another below it, called diezeugmenon. See the articles DIAGRAM and DIEZEUGMENON.

HYPERBOLE, in rhetoric, a figure, whereby the truth and reality of things are excessively either enlarged, or diminished. See the article EXAGGERATION.

The word is greek, ὑπερβολή, superlatio; formed of the verb υπερβαλλειν, *exsuperare*, to exceed, surpass by far.

The character of an hyperbole is to exaggerate or extenuate the idea of the things spoken of, beyond the bounds of truth, or even probability. As, he ran swifter than the wind: he went slower than a tortoise, &c. Hyperboles, says Seneca, lie without deceiving; they lead the mind to truth by fictions; they convey the sentiment intended, tho' by expressing it in terms which render it incredible. The hyperbole promises too much, in order to make you conceive enough.

Aristotle observes, that hyperboles are the favourite figures of young authors, who love excess and exaggeration; but that philosophers should not use them without a great deal of reserve. The pitch to which an hyperbole may be carried, is a point of great delicacy. To carry it too far, is to destroy it: it is of the nature of a bowstring, which by immoderate tension, slackens; and frequently has an effect quite contrary to that intended.

Those hyperboles are best, which are latent, and are not taken for hyperboles. For this reason they should scarce ever be used but in a passion, and in the middle of some important incident: such is the hyperbole of Herodotus, speaking of the Lacedæmonians, who fought at Thermopylæ: "They defended themselves for some time with the arms" "that were left them, and at last with" "their hands and teeth; till the Barbarians, continually shooting, buried" "them as it were, with their arrows." Now what likelihood is there, that naked men should defend themselves with their hands and teeth against armed men; and that

that so many persons should be buried under their enemies arrows? Yet does there appear some probability in the thing, by reason it is not fought for the sake of the figure, but the hyperbole seems to arise out of the subject itself. Of the like kind is that passage in a comic poet mentioned by Longinus; "He had lands in the country no larger than a Lacedæmonian epistle."

**HYPERBOLIC**, or **HYPERBOLICAL**, something relating either to an hyperbole, or an hyperbola. See the article **HYPERBOLE** and **HYPERBOLA**.

Thus we say, an hyperbolic expression; an hyperbolic image, &c.

**HYPERBOLIC CONOID**. See **CONOID**.

**HYPERBOLIC CYLINDROID**, is a solid figure, whose generation is given by Sir Christopher Wren, in the Philosophical Transactions. Thus, two opposite hyperbolas being joined by the transverse axis, and through the center a right line being drawn at right angles to that axis; and about that, as an axis, the hyperbolas being supposed to revolve; by such revolution, a body will be generated, which is called the hyperbolic cylindroid, whose bases, and all sections parallel to them, will be circles. In a subsequent transaction, the same author applies it to the grinding of hyperbolic glasses; affirming, that they must be formed this way or not at all.

Hyperbolic leg of a curve, is that which approaches infinitely near to some asymptote.

Sir Isaac Newton, reduces all curves, both of the first and higher kinds, into those with hyperbolic legs, and those with parabolic ones. See the article **CURVE**.

**HYPERBOLIC LINE** is used by some authors for what we call the hyperbola itself. In this sense, the plane surface, terminated by the curve line, is called the hyperbola, or hyperbolic space; and the curve line that terminates it the hyperbolic line.

**HYPERBOLIC MIRROR**. See **MIRROR**.

**HYPERBOLIC SOLID**. See **CUBATURE**.

**HYPERBOLIFORM FIGURES**, are such curves as approach, in their properties, to the nature of the hyperbola; called also hyperboloides.

**HYPERBOLOIDES**, are hyperbolas of the higher kind, whose nature is expressed by this equation:  $ay^m \times x^n = bx^m(a + x^n)$ : especially if  $m > 1$ , or  $n > 1$ , e.g.  $ay^3 = bx^2(a + x)$ .

**HYPERCATALECTIC**, in the greek and latin poetry, is applied to a verse, which has one or two syllables too much, or beyond the regular and just measure: as,

*Musæ sorores sunt Minervæ.* Also, *Musæ sorores Palladis lugent.*

The greek and latin verses are distinguished, with respect to their measure, into four kinds, acatalectic, catalectic, brachycatalectic, and hypercatalectic. See **ACATALECTIC**, &c.

The hypercatalectic is also called the hyperpreter.

**HYPERDULIA**, in the church of Rome, a species of worship paid to the holy virgin; being greater than the dulia, or worship paid to the saints, but less than the latria or supreme worship paid to the deity. See **ADORATION** and **WORSHIP**.

**HYPERICOIDES**, a plant otherwise called ascyrum. See **ASCYRUM**.

**HYPERICUM**, *St. JOHN'S WORT*, a genus of the *polyadelphia polyandria* class of plants, the flower of which consists of five oblong, obtuse, patent petals: the fruit is a roundish capsule, with two, three or five cells, containing a great number of oblong small seeds. See pl. CXXXVIII. fig. 2.

This genus comprehends the androsæmum and ascyrum of Tournefort.

*St. John's wort* is recommended as a vulnerary, detergent, and diuretic: it resolves coagulated blood, destroys worms, and promotes the menses and urine.

**HYPERMETER**, in the antient poetry the same with hypercatalectic. See the article **HYPERCATALECTIC**.

**HYPERSARCOSIS**, in medicine and surgery, an excess of flesh, or rather a fleshy excrescence, such as those generally arising upon the lips of wounds, &c. See **WOUND** and **EXCRESCENCE**.

**HYPERTHYRON**, in the antient architecture, a sort of table used after the manner of a frieze, over the jaumbs of doric doors and gates, and the lentils of windows. It lies immediately under the corona, and our workmen usually call it the king-piece.

**HYPHEN**, an accent, or character, in grammar, implying that two words are to be joined, or connected into one compound word, and marked thus -, as pre-established, five-leaved, &c.

Hyphens also serve to connect the syllables of such words as are divided by the end of the line.

**HYPNOTIC**, in the materia medica, such medicines as any way produces sleep, whether called narcotics, hypnotics, opiates, or soporifics.

Authors are of various opinions in regard to the manner wherein hypnotics operate. See the article **NARCOTICS**.

**HYPNUM**, in botany, a genus of mosses of the *cryptogamia* class of plants, consisting of stalks and leaves, and producing membranaceous capsules; these capsules stand on pedicles, which grow on the axes of the leaves, and have at their base a kind of squamous covering, formed of a matter quite different from the leaves of the plant: the capsules of the hypnum have all their calyptræ; they are of different shapes, but usually long; likewise the squamous involucrem at the base of the pedicle is called by Dillenius perichætum, and is the greater characteristic of the hypna, no mosses of any other genus having it in this form. See plate **CXXXIX.** fig. 2.

**HYPOCAUSTUM**, among the Greeks and Romans, a subterraneous place, wherein was a furnace, to heat the baths. See the article **BATH**.

Another sort of hypocaustum was a kind of kiln, to heat their winter-parlours. Among the moderns, it is that place where the fire is kept, that warms a stove or hot-house.

**HYPOCHOERIS**, in botany, a genus of the *syngenesia-polygamia-aqualis* class of plants, the compound flower of which is imbricated, uniform, and consists of numerous hermaphrodite small flowers, that are all equal; the partial flower is monopetalous, ligulated, linear, truncated, and divided into five segments; there is no pericarpium; the cup is connivent and globose-accuminated; the seed is single, oblong, and ending in a subulated pedicle, covered with down.

**HYPOCHONDRIA**, in anatomy, that part of the body on both sides, which lies under the spurious ribs, and is extended to the ilia; comprehending not only the muscles, but the internal viscera.

**HYPOCHONDRIAC PASSION**, a spasmodico-flatulent affection of the stomach and intestines, arising from a preternatural constitution of the peristaltic motion, caused by the stagnation of the blood and vital fluids between the nervous and muscular coats of the intestines.

This disease is attended with such a train of symptoms, that it is a difficult task to enumerate them all; for there is no part

of the body that is not, sooner or later, a sufferer by its tyranny. It begins with tensions and windy inflations of the stomach and intestines, an uncertain appetite, sometimes quite decayed, and sometimes strong; the aliments are ill digested; breeding acid and viscid crudities; there is a pressing heavy pain in the stomach, chiefly after meals; a violent heart burn, very acid belchings and vomiting, bringing up such acid stuff that the teeth are not only set on edge, but the very linnen or sheets sometimes corroded; In the intestines, about the navel, there are felt heavy excruciating pains; in the gross intestines the pains are more acute. Sometimes there is a looseness; sometimes a most obstinate costiveness, with a retention of the wind; which when it breaks out, either upwards or downwards, is attended with an alleviation of the symptoms; but they soon rage again, with as great a violence as ever. The urine is generally thin, limpid, and pale; but sometimes it has a copious sediment mixed with fabulous concretions, and often apes a fit of the gravel. In the breast there is a great straitsness, a difficulty of breathing, and a fluttering and palpitation of the heart. As the disease increases, the patient is troubled with the head-ach, a noise in the ears, with difficulty of hearing; the eyes are clouded, some have double vision, or a pain and dryness of the eyes, and in the tongue a most troublesome burning pain, fixed to a certain space, with a plentiful excretion of spittle. At length the animal functions are impaired, the mind is disturbed on the most trivial occasions, and is hurried into the most perverse commotions; the patient entertains wild and extravagant fancies, the memory grows weak, and the reason fails. Some symptoms affect the whole body, which is covered with blotches, or copious sweats; the strength decays, the limbs are languid and unapt for labour; the body becomes tabid, the joints are tormented sometimes with a blunt, and sometimes with a cutting pain; at last, all the secretions, especially the sanguineous, are perverted. In short, as Dr. Sydenham observes, it imitates all kinds of distempers so exactly, as to require the utmost sagacity of a physician, to distinguish it from an essential disease of any part.

The remote causes of this disorder are, an hereditary disposition to it, a sedentary studious life, sadness, cares, trouble

of mind, intense thinking on a single subject, a cold and moist constitution of the air; gross, impure, flatulent diet; tedious diseases, not rightly treated; the suppression of the hæmorrhoids and menses, and other periodical fluxes of the blood; hard labour in child-bearing, &c.

Though hypochondriacs are never perfectly well, yet they are generally worst in the autumnal and winter seasons. Women generally suffer most about the time when their menses ought to flow. And it is worthy of observation, that those affected with this disease, are seldom attacked with continual, epidemic, or contagious fevers, not even with the plague itself.

As to the prognostics, if the disease be recent, and left to itself, it is not dangerous; but if it be inveterate, and not skilfully treated, or a bad regimen is followed; it is attended with more grievous symptoms, and produces obstructions, and schirri of the viscera, a cachexy, a dropsy, an hectic, a convulsive asthma, an incurable melancholy or madness, &c. But if it be caused by a suppression of the menses, or bleeding piles, the disease will be cured by restoring the flux.

As continual fear and diffidence are symptoms of this disease, the patients are always foreboding terrible things, and live in constant dread, which renders them fickle, impatient, and prone to run from one physician to another; therefore, when a cure is attempted, they must be encouraged and persuaded to be patient, and then the following indications may be pursued: 1. To correct and evacuate the acid, viscid, bilious filth, and flatulentordes from the primæ viæ, which yield continual fuel to this disease. 2. The spasms being appeased, to restore the natural order of the peristaltic motion of the intestines, and to recover it from a languid state, that there may be a due concoction of the aliment, a laudable chyle and other fluids generated. 3. To disperse the stagnated juices, in order to render the circulation of the blood equable through the abdomen and the rest of the body; and to free the fluids from all acrimony, after facilitating the excretions by urine, and through the skin. 4. And, lastly, to corroborate the whole nervous system.

To answer the first intention, nothing is better in the fit than clysters made with

emollient herbs, water-gruel strained, camomile-flowers, the tops of yarrow; the oils of sweet almonds, dill, camomile, linseed, &c. adding a carminative species made of carraway, dill, but more especially cumin-seeds. These should be repeated if the spasms render them ineffectual. Nor must gentle laxatives of manna, rhubarb, and cream of tartar be neglected. If there be a great deal of acid filth in the stomach, crab's eyes alone will purge. To correct theordes in the primæ viæ, give the absorbent, precipitating, and antispasmodic powders, such as crab's eyes, mother of pearl, petrified nitre, prepared amber, cinnabar, tartar vitriolate, with a little castor. It will also be proper to take a decoction of any of the following things, in bed, to promote a diaphoresis, viz. balm, veronica, betony, daisy-flowers, camomile-flowers, fennel-seed, &c.

To restore the digestive power of the stomach, give essence of orange-peel, tincture of tartar, dulcified spirit of nitre, &c.

The paroxysms are relieved by a tepid pediluvia, made of wheat-bran, water, and camomile-flowers, in which the feet should be put pretty deep.

Out of the fit, to discuss the stagnation of the blood, bleeding in the foot will be necessary, especially at the equinoxes, and at other times, as occasion shall require; but this should be after laxatives and pediluvia. If there be a disposition to an hæmorrhoidal flux, leeches should be applied every month; and the patient should also take balsamic pills, with antispasmodic nitrous powders.

To strengthen the nervous system, nothing is better than chalybeates; for they by a gentle striction, restore the nerves to their former strength. Outwardly, a saponaceous plaster, with camphire, may be laid to the hypochondria, with no small advantage.

In a thin bilious habit of body, a milk-diet is good, if the first difficulty can be got over, viz. its coagulating in the stomach; otherwise it will not be sufficient to sustain the body in due strength. But nothing is more friendly, nor gives greater energy to the blood and spirits, than moderate exercise, and particularly riding on horseback almost every day, and for a considerable time together; nor does riding in a coach want its salutary effects.

**HYPOCYSTIS**, in pharmacy, an inspissated juice, obtained from the sessile asarum

rum, much resembling the true egyptian acacia. See the article *ASARUM*. They gather the fruit, while unripe, and exprefs the juice, which they evaporate over a very gentle fire, to the consistence of an extract, and then form into cakes, and expose them to the sun to dry.

*Hypocyst* is an astringent, and that of considerable power; it is good against diarrhoeas and hæmorrhages of all kinds, and may be used in repellent gargarisms in the manner of the acacia; but it is very rarely met with genuine in our shops, the german acacia being usually sold under its name.

**HYPOGASTRIC**, an appellation given to the internal branch of the iliac artery. See the articles *ARTERY* and *ILIAC*.

**HYPOGASTRIC VEINS** arise on each side from the iliacs; and send out branches to the rectum. See the article *VEIN*.

**HYPOGASTRIUM**, in anatomy, the lower part of the abdomen. See the article *ABDOMEN*.

**HYPOMOCHLION**, in mechanics, the same with fulcrum. See *FULCRUM*.

**HYPOPHYLLOCARPODENDRON**, in botany, a plant called by Linnæus leucodendron. See *LEUCODENDRON*.

**HYPOPITYS**, in botany, a plant otherwise called *monotropa*. See the article *MONOTROPA*.

**HYPOPYON**, in medicine, a collection of purulent matter under the cornea of the eye. See the article *EYE*.

As to the cure of an hypopyon, it should first be attempted by violently shaking the patient's head, in a supine posture, and pressing the eye before, with the fingers, in order to remove, or at least loosen the matter.

But if this proves unsuccessful, the patient being seated as in the couching for a cataract, an incision is made with a lancet, through the cornea, below the pupil, and about the space of a line from the white of the eye, and that large enough to discharge the matter and aqueous humour; pressing the eye gently by the fingers, and taking care lest you wound the uvea: then a compress, moistened with a proper collyrium, is to be applied every third or fourth hour to the eye. If the matter be too thick to be discharged, the needle, which is also employed for making setons, is to be used. The instruments should be wrapped up, so that only the point be bare. In this case, St. Yves advises to introduce a small probe,

or inject some cold water with a syringe, and continue this till the whole pus be dissipated, after which the wound may be healed.

**HYPORCHEMA**, in the greek poetry, a poem, consisting of divers kinds of verse, and of different lengths; but always full of short, or pyrrhic feet.

**HYPOSTASIS**, among divines, signifies a person, or substance; chiefly used in speaking of the persons of the Trinity. See the article *TRINITY*.

**HYPOSTASIS**, in medicine, denotes the sediment of urine.

**HYPOTHECA**, in the civil law, the same with mortgage in the common law. See the article *MORTGAGE*.

**HYPOTHENAR**, in anatomy, the abductor muscle of the little finger. See the article *ABDUCTOR*.

**HYPOTHENUSE**, in geometry, the longest side *AC* (plate *CXXXVII*. fig. 2.) of a right-angled triangle *ABC*; or it is that side which subtends the right angle *B*.

Euclid, lib. I. proposition *XLVII*. demonstrates, that, in every rectilinear right-angled triangle, the square of the hypotenuse *AC* (*ibid.*) is equal to the squares of both the other sides *AB*, *CB*; or, that  $AC^2 = AB^2 + CB^2$ .

This celebrated problem was discovered by Pythagoras, who is said to have sacrificed a hecatomb to the Muses, in gratitude for the discovery.

**HYPOTHESIS**, in general, denotes something supposed to be true, or taken for granted, in order to prove or illustrate a point in question.

An hypothesis is either probable or improbable, according as it accounts rationally or not for any phenomenon: of the former kind we may reckon the copernican system and Huygens's hypothesis concerning the ring of saturn; and the ptolemaic system may be esteemed an instance of the latter. See the article *COPERNICAN*, &c.

Hypotheses, however elegant and artful, ought to be first proved by repeated observations and constant experience, before they are received as truths. See the article *EXPERIMENTAL PHILOSOPHY*.

**HYPOTHETICAL PROPOSITIONS**. See the article *PROPOSITION*.

**HYPOTRACHELION**, in architecture, denotes a little frieze in the tuscan and doric capitals, between the astragal and annulets, called likewise *colerin*, *gorgerin*, &c. By some it is applied to the neck

neck of any column, or that part of the capital thereof, below the astragal.

**YPOTYPOSIS**, in rhetoric, signifies a lively description.

**YPOZOMA**, in anatomy, a membrane that separates two cavities : such is the diaphragm.

**YPSILOIDES**, in anatomy, the same with the os hyoides. See the article **HYOIDES**.

**YSSOP**, *hyssopus*, in botany, a genus of the *didynamia-gymnospermia* class of plants, the flower which is monopetalous and ringent, the upper lip being erect, roundish, and emarginated, and the lower one divided into three short segments, the middle one of which is hollow and cordated ; the flower is succeeded by four small seeds, which are roundish and of a brown colour. See plate CXXXIX. fig. 3.

Hyssop is attenuant and discutient, and is recommended in disorders of the lungs, when they are loaded with a foul and thick matter ; it strengthens the stomach and assists digestion ; and by its acrimony, and power of attenuating the viscous matter in the lungs, promotes expectoration, and is therefore good in asthma : its good effects in the stomach are of the same kind, depending on its attenuating and absterging the viscous phlegm lodged there, which impedes the discharge of its proper functions. It is also good in diseases of the head.

It is best taken in infusion, in the manner of tea, not made so strong as to be disagreeable to the palate, and often repeated. A simple water of it, which retains much of its taste, smell, and virtues, is kept in the shops ; they used also to have a syrup of it, but that has of late been disregarded.

Externally, hyssop is greatly recommended in bruises ; the blackness settling under the eyes from blows is carried off very readily by a cataplasm of the leaves, or only a little bundle of them sewed up in a linnen-rag, and applied to the part : and Ray gives us an account from Mr. Boyle, of a violent contusion of the thigh, from the kick of a horse, very happily cured by this herb, boiled as a cataplasm ; he tells us, the violent pain was almost instantly removed, and the very mark and blackness taken off in a few hours.

**HYSTERIC**, or **HYSTERIC PASSION**, in medicine, a spasmodico-convulsive affection of the nervous system, proceeding from the womb, and caused by the retention or corruption of the blood and

lymph in its vessels ; and more or less infesting the nervous parts of the whole body, by means of the nerves of the os sacrum, the loins, and the whole spinal marrow.

Hoffman, contrary to the sentiments of Willis, will not allow the uterus to be a nervous part ; for he affirms that the hysteric passion, which is attributed to a vice in the womb, is owing to spastic, convulsive, and epileptic disorders, all which arise from a fault of the genus nervosum. But Astruc observes, that the effects of impressions are various, according to the degree of their intensity : thus, tickling the nose with a feather, will cause sneezing ; of the fauces, vomiting ; while a violent impression only causes simple pain ; which is the case of the uterus in the hysteric passion : for the causes of this disease, from observation, are the preternatural oscillations of the uterine arteries, on the approach of the menses, or their suppression, when they are distended with blood ; an irritation of the uterus from the fluor albus ; various tumours in the uterus ; the acrimony of the feminal fluids. These affections of the uterus draw the other parts into consent, as poisons in the stomach produce convulsions, a syncope, and sweats. This disease has been very improperly confounded with the hypochondriac passion : for a strangulation of the fauces, an intercepted breathing even to suffocation, a fainting away, a loss of voice, a profound sleep, are the true, proper, and essential signs and symptoms of this uterine disease.

An hysteric fit is, according to Hoffman, generally preceded with a pressing pain of the forehead, temples, or eyes, with an effusion of tears, a dimness of sight, a dulness of the mind and senses, a loathing of all things. When the fit comes on, the patient is exceeding colicive, and yet has a strong stimulus to discharge her urine, which is as clear as water ; the breathing is uneasy, difficult, and short ; and a languor seizes the whole body : to these succeed a pain in the loins, a great shivering and shaking ; the belly is hard and inflated ; afterwards the navel is drawn inwards, and outwardly leaves a great pit ; then they feel a sort of a globe arise from the lower part of the belly to the hypochondria and diaphragm ; soon after the heart begins to flutter and beat with a hard, unequal, and sometimes intermitting pulse ; the extreme parts grow cold,

cold, the fauces are straitened, the face pale, the breathing exceeding difficult, the voice ceases, the pulse is almost imperceptible, and there is such a stricture of the belly that no flatus can be emitted, nor no clyster given. In some there are convulsions of the head and limbs; others lie in a profound sleep, without sense or motion; others have their face and neck look red and inflamed, with a strong pulse; and others again break out into immoderate laughter, and regaining their voice, say a great many silly things.

When they begin to come to themselves, the pulse, which was before weak, languid, and obscure, becomes brisk, soft, and strong; heat returns to the extreme parts, the face looks ruddy, the wind forces its way upwards, there is a rumbling in the belly, and at length the patients, waking as it were out of a profound sleep, have their voices, senses, and motion restored; yet they complain of a heavy pain in the head, a languor of the body, feet, and thighs. Some have continued in a fit so long, that they have been laid out for dead.

The hysteric passion attacks women that are pregnant, or in child-bed; widows that are full of blood, after some grievous passion of the mind; or maids, after a sudden suppression of the menses.

This disease, according to the last mentioned writer, may be caused by whatever promotes a more plentiful afflux of the blood and genital fluid to the uterine parts, or impedes the eruption of the menses, or occasions their suppression: hence maids and widows are most subject thereto; also women of a sanguine and bilious constitution, who live high, drink generous wines, feed on high-seasoned aliment, and are subject to violent passions and commotions of the body and mind: on the other hand, those who live a sedentary life, feed on coarse, acid, low diet, who have omitted usual bleeding, who are oppressed with sorrows, cares, and disappointments, are liable to this disease; for by these the blood is thickened, the solid parts weakened, and consequently the flowing of the menses rendered more difficult. Likewise, sudden terror, and the body being exposed to uncommon cold during the time of the menstrual flux, by giving it a check, procure hysteric spasms. Some are subject to the same disorder from the smell of perfumes.

However dreadful and cruel this disease

may appear, yet it is not very dangerous in itself, unless ill managed, or the patient be exceeding weak and valetudinary: it is most apt to turn into convulsions and an epilepsy.

In the cure, it must be carefully observed, whether the woman is plethoric, or exhausted of blood and strength. In the former case, the spasms or convulsions are more violent and copious; bleeding is a present help, and many have been brought to themselves who were seemingly dead, if the florid colour of their face had not shewn to the contrary.

In the fit it will be proper to apply fetid things to the nose, such as foetida, preparations of castor, partridges feathers burnt, &c. For women in child-bed, a girdle made of russia leather, and bound pretty tight, is excellent. Likewise clysters made with roots and seeds of lovage, which are specifics, camomile-flowers, elder-flowers, veronica, the carminative seeds boiled in whey; to which may be added oil of elder, dill, or camomile. Externally plasters made of opopanax, bdellium, galbanum, sagapenum, and asa foetida, may be applied to the navel. Some greatly recommend fumigations for the uterus, of musk, civet, storax, and benjamin.

Inwardly, the patient may take thirty or forty drops of tincture of castor, in cold water; or if she can swallow them, the following pills: take myrrh, sagapenum, opopanax, asa foetida, saffron, and the theriaca andromache, of each half a dram; adding sometimes six or eight grains of camphire and laudanum opiatum. From each scruple of this must ten pills be made, two of which are to be taken every hour, with a due quantity of water of camomile-flowers.

Some hysterial disorders, according to Dr. Mead, observe the lunar phases, and partake of the nature of an epilepsy: they seldom require bleeding, and purging should be used with caution. Emetics are of greater service, especially a little before the fit. In the fit, the Dr. observes, the best medicines are those which repair the loss of spirits, as russian castor, gum ammoniac, and salt of amber, in pills. Take gum ammoniac, two drams; russian castor, one dram; salt of amber, half a dram; with a sufficient quantity of the peruvian balsam: make this mass into small pills, and let the dose, which is one scruple, be repeated as occasion requires.



Out of the fit, he prescribes native cinnamon, and wild valerian-root, as most proper for correcting the juices.

To prevent its degenerating into a chronic disease, particularly the hypochondriac passion, Hoffman advises that care should be taken to keep the menses regular, which must be done by balsamics, composed of myrrh and amber, with bitter and carminative extracts, especially zedoary and orange-peel, made into an elixir with a moderately spirituous menstruum : this frequently helps the digestion, and promotes a regular menstrual discharge.

But it is necessary to observe, that, in hysterical cases, the same remedies have a different effect on different women : some cannot bear fetid medicines, which to others are an immediate relief : some have fallen into a terrible syncope, and have come to themselves by sprinkling cold water on the face, when more powerful and spirituous things have failed. Others cannot endure hot things inwardly, nor outwardly, as baths, fomentations, liniments, and nervous applications. Anodynes and opiates, which procure ease and rest to some, are very injurious to others who are greatly debilitated, and whose nerves are weak. Some have recovered from a violent paroxysm by a draught of cold water, which given to others has increased the disorder.

When purging is necessary, it will be best to prescribe currants, well saturated with a gentle decoction of rhubarb.

Sydenham prescribes the peruvian bark, morning and evening, in a scruple at a time, as an excellent remedy in hysterical convulsions.

In the fits, besides the remedies already mentioned, Astruc recommends a few grains of civet, or musk, alone, or tied in a thin rag, and introduced into the vagina, which helps to discharge the morbid and noxious humours of the uterus. Out of the fit, he observes that mirth and exercise have alone often cured this distemper. The best remedies are castor, asa foetida, galbanum, sagapenum, and myrrh ; five grains in powder is a dose, or ten drops of the tinctures ; as also gentle purges of cassia, manna, or infusion of senna.

**HYSTERIC COLIC**, a common symptom of the hysterical passion, attended with a most

violent pain about the pit of the stomach ; as also with a vomiting of a greenish humour, and great sinking of the spirits. After a day or two the pain goes off, but upon the slightest motion or perturbation of the mind it soon returns again.

Neither bleeding nor cathartics have any place in the cure. According to Sydenham, it will be proper first to advise the patient to drink upwards of a gallon of posset-drink, to clear the stomach of its impurities, by throwing it up again, that the paregoric may not be hindered ; afterwards give twenty-five drops of the thebaic tincture, in an ounce of the spirit of cinnamon-water. This last is to be repeated, at due intervals, till the symptoms disappear ; that is, the effect of one dose must be known, before another is given : yet sometimes in plethoric bodies, if the strength will permit, it is better to prepare the way by bleeding and purging, or both, for an anodyne.

But if the hysterical colic comes on by fits, the following may be used in the intervals, or when the fit is off ; take large doses of the balsam of Peru, that is, twenty, thirty, or forty drops, in a spoonful of the finest and whitest sugar : this may be taken twice or thrice in a day.

**HYSTEROLOGY**, the same with hysteroproteron. See the next article.

**HYSTERON PROTERON**, in grammar and rhetoric, a species of the hyperbaton, wherein the proper order of construction is so inverted, as that the part of any sentence which should naturally come first is placed last, as in this of Terence, *valet & vivit*, for *vivit & valet* ; and in the following of Virgil, *moriamur & in media arma ruamus*, for *in media arma ruamus & moriamur*.

**HYSTEROPHORUS**, a plant called by Linnæus parthenium. See the article **PARTHENIUM**.

**HYSTEROPOTMI**, ὑστεροποτμοι, in grecian antiquity, the same with deuteropotmi. See the article **DEUTEROPOTMI**.

**HYSTERO TOMIA**, ὑστεροτομία, in anatomy, an anatomical dissection of the uterus or womb. See the article **UTERUS**.

**HYSTERO TOMOTOCY**, ὑστεροτομοτομία, among chirurgical writers, the same with the cesarian section. See **CÆSARIAN**.

**HYSTRIX**, or **HISTRIX**, in zoology. See the article **HISTRIX**.

**HYTHE**, or **HITHE**. See **HITHE**.

## I.

**I**, or i, the ninth letter, and third vowel of the alphabet, is pronounced by throwing the breath suddenly against the palate, as it comes out of the larynx, with a small hollowing of the tongue, and nearly the same opening of the lips and talk as in pronouncing *a* or *e*. Its sound varies; in some words it is long, as *high*, *mind*, &c. in others short, as *bid*, *hid*, *fin*, &c. in others again, it is pronounced like *y*, as in *collier*, *onion*, &c. and in a few, it sounds like *ee*, as in *machine*, *magazine*, &c. No english word ends in *i*, *e* being either added to it, or else the *i* turned into *y*.

But besides the vowel, there is the *jod* consonant; which because of its different pronunciation, has likewise a different form, thus *J*, *j*. In english, it has the soft sound of *g*; nor is used, but when *g* soft is required before vowels, where *g* is usually hard: thus we say, *jack*, *jet*, *join*, &c. instead of *gack*, *get*, *goin*, &c. which would be contrary to the genius of the english language. See the article *ENGLISH*.

**I**, used as a numeral, signifies no more than one, and stands for so many units as it is repeated times: thus **I**, one; **II**, two; **III**, three, &c. and when put before a higher numeral, it subtracts itself, as **IV**, four; **IX**, nine, &c. but when set after it, so many are added to the higher numeral, as there are **I**'s added: thus **VI** is 5 + 1, or six; **VII**, 5 + 2, or seven; **VIII**, 5 + 3, or eight. The ancient Romans likewise used **IO** for 500, **CIO** for 1000, **IOO** for 5000, **CCIOO** for 10,000, **IOOO** for 50,000, and **CCCIOO** for 100,000. Farther than this, as Pliny observes, they did not go in their notation; but when necessary, repeated the last number, as **CCCIOOO**, **CCCIOOO** for 200,000; **CCCIOOO**, **CCCIOOO** for 300,000; and so on.

**I**, used as an abbreviature, is often used for the whole word *Jesús*, of which it is the first letter.

**JAAR**, a river of the bishopric of Liege, which falls into the Maes, at Maestricht.

**JABAJAHITES**, a modern sect of Mahometans, who teach that the knowledge

of God extends not to all things, but is perfected by experience; and that he governs the world according to the course of contingent events, as not having had from eternity a perfect knowledge of all things future. This doctrine is looked upon, by the other musfulmen, as impious and blasphemous.

**JABLUNKA**, a town of Silesia, in the territory of Trefsch: east long. 18°, north lat. 49° 37'.

**JABOTAPITA**, in botany, the same with the *ochna* of Linnæus. See *OCHNA*.

**JACATRA**, or *BATAVIA*. See *BATAVIA*.

**JACCA**, a city and bishop's see of Arragon, in Spain, sixty miles north of Saragossa: west long. 50°, and north lat. 42° 50'.

**JACEA**, *KNAPWEED*, in botany, is comprehended by Linnæus among the *centauria*. See *CENTAURIA*.

**JACENT**, a termed applied by Helmont to nature, when a disease is risen to a head, and the morbid matter strives to suppress the vital flame.

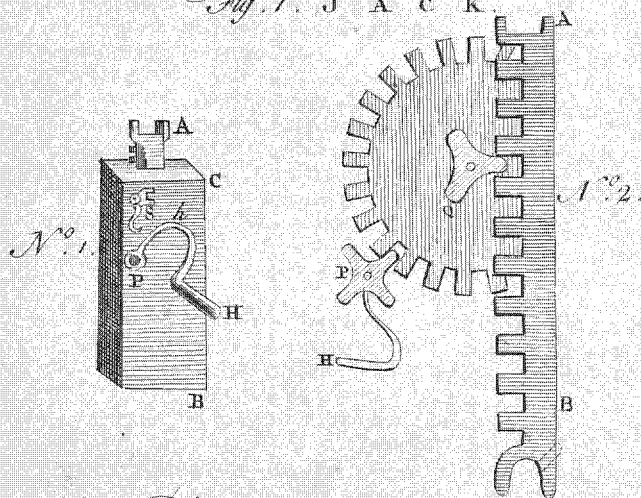
**JACK**, in mechanics, an instrument of common use for raising heavy timber, or very great weights of any kind. See plate *CXLII*. fig. 1. n° 1.

But as the wheel-work of it is shut up in the strong piece of timber *CB*, we have given a representation of it (*ibid*. n° 2.) where you must suppose the rack *AB* at least four times as long in proportion to the wheel *Q*, it being here so much contracted; and the teeth, which will then be four times more in number, to be contained about three in an inch. Then if the handle *HP* be seven inches long, five turns of it, that is five times twenty-two inches, or 110 inches, will be the velocity of the power; whilst the weight raised by the claw *A*, or depressed by the claw *B*, moves one inch: for 'as the pinion of the handle has but four leaves, and the wheel *Q* twenty-three, there must be five revolutions of the handle to turn the wheel once round; whose three-leaved pinion, *R*, will in that revolution just move the rack *AB* three teeth or one inch.

This might have been also known without seeing, or even knowing, the number of the teeth of the wheel and pinions,

by

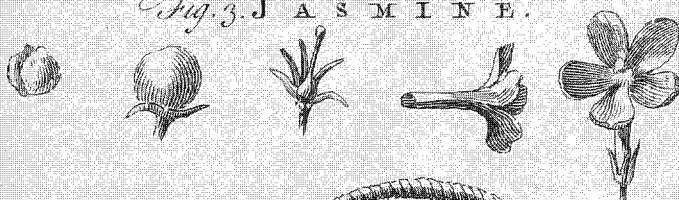
*Fig. 1. JACK.*



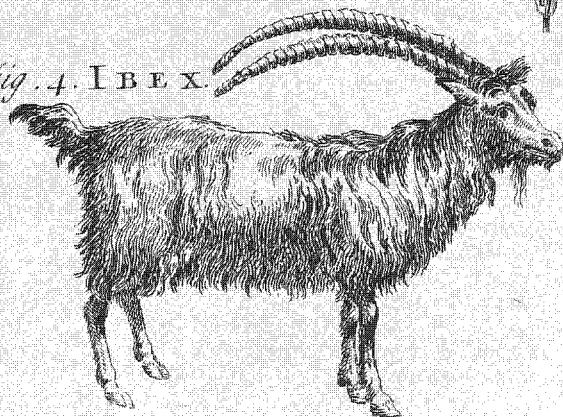
*Fig. 2. JACKALL.*



*Fig. 3. JASMINE.*



*Fig. 4. IBEX.*





by measuring a revolution of the handle in n° 1. and comparing the space gone through by it with the space gone through by the ends of the rack A or B.

Sometimes this machine is open behind, from the bottom almost up to the wheel Q, to let the lower claw, which in that case is turned up at B, draw up any weight; and when this is effected to a sufficient height, it is prevented from falling down again by putting the end of the hook S (*ibid.* n° 1.) fixed to a staple, over the curved part of the handle at b.

All parts of this machine must be made very strong, but chiefly those which immediately sustain the weight.

The common kitchen jack is a compound engine; where the weight is the power applied to overcome the friction of the parts, and the weight with which the spit is charged; and a steady and uniform motion is obtained by means of the fly. See the article FLY.

JACK, in ichthyology, a name sometimes given to the lucius or pike. See the article LUCIUS.

JACK-FLAG, in a ship, that hoisted up at the sprit-sail top-mast head. See FLAG.

JACK-DAW, in ornithology, a species of *corvus*, with a black and grey head, a brownish black body, and the wings and tail black.

It is one of the smallest of the crow-kind, but an erect and well-shaped bird. See the article CORVUS.

JACKALL, in zoology, an animal of the dog-kind, with a slender snout. See the article CANIS.

It is a very beautiful creature, and so like a dog, as to be mistaken at first sight for some mongrel breed of that animal. See plate CXLII. fig. 2.

Its size is that of a small hound; and, in the East, where it is a native, there are vast packs of them, often more than 200 in a company, which hunt animals they would never dare to attack single. It is not impossible that lions and other beasts of prey may be alarmed by the cries of these animals in their chase, and fall in and rob them of their prey; but the general opinion of their attendance on the lion, is fabulous.

JACOB'S STAFF, a mathematical instrument otherwise called cross-staff. See the article CROSS-STAFF.

JACOBÆA, RAGWORT, in botany, is ranked by Linnæus in the same genus with *senecio*. See *SENECIO*.

JACOBÆASTRUM, a plant otherwise called othonna. See OTHONNA.

JACOBÆOIDES, a species of *solidago*. See the article SOLIDAGO.

JACOBINE, or JACK, in ornithology, a very small sort of pigeon, with a range of feathers inverted quite over the hinder part of the head; bearing some resemblance to a friar's hood, whence the name.

JACOBINE MONKS, the same with the dominicans. See DOMINICANS.

JACOBITES, a term of reproach bestowed on the persons, who vindicating the doctrines of passive-obedience and non-resistance with respect to the arbitrary proceedings of princes, disallow of the late revolution, and assert the supposed rights, and adhere to the interests of the late abdicated king James and his family.

JACOBITES, in church-history, a sect of christians in Syria and Mesopotamia; so called either from Jacob, a Syrian, who lived in the reign of the emperor Mauricius; or from one Jacob, a monk, who flourished in the year 550.

The jacobites are of two sects, some following the rites of the latin church, and others continuing separated from the church of Rome. There is also at present a division among the latter, who have two rival patriarchs, one of whom resides at Caramit, and the other at Derzapharan. As to their belief, they hold but one nature in Jesus Christ; with respect to purgatory and prayers for the dead, they are of the same opinion as the Greeks, and other eastern christians: they consecrate unleavened bread at the eucharist, and are against confession, believing that it is not of divine institution.

JACOBITE MONKS, religious, of the sect of jacobites, in Armenia, Mesopotamia, &c.

JACOBUS, an antient gold-coin worth twenty-five shillings. See COIN.

JADE-STONE, the name given to a hard, greyish-green species of jasper, of which the Turks generally make the handles of the sabres of great people. See the article JASPER.

JAFFA, antiently called JOPPA, is a port-town of Palestine in asiatic Turkey, situated thirty miles north-west of Jerusalem: east long. 36°, north lat. 32° 20'.

JAFNAPATAN, a port-town at the north end of the island of Ceylon, in the East Indies; subject to the Dutch: east long. 79°, north lat. 10°.

JAGENDORF, a city of Silesia, twelve miles north-west of Tropolaw: east long. 17° 6', north lat. 50° 8'.

*St.* JAGO, the chief of the Cape Verd islands, in Africa, 300 miles west of Cape Verd; subject to Portugal: west long.  $24^{\circ}$ , north lat.  $15^{\circ}$ .

*St.* JAGO, the capital of the island of Cuba, 100 miles north-west of Jamaica: west long.  $76^{\circ} 30'$ , north lat.  $20^{\circ}$ .

*St.* JAGO, the capital of the province of Chili, in south America, situated six miles west of the mountains of Andes, and eighteen east of the Pacific ocean: west long.  $77^{\circ}$ , south lat.  $35^{\circ}$ .

JAGO DE LA VEGA, or Spanish Town, the capital of Jamaica, situated at the south-east part of the island, about seven miles north-west of Port Passage and the bay of Port Royal: east long.  $76^{\circ} 30'$ , north lat.  $18^{\circ} 20'$ .

JAGODNA, a town of european Turkey, in the province of Servia, situated on the river Moraw: east long.  $22^{\circ}$ , north lat.  $43^{\circ} 20'$ .

JAICZA, a city of european Turkey, in the province of Bosnia, fifty miles north-east of Bosnageraio: east long.  $18^{\circ}$ , north lat.  $45^{\circ} 5'$ .

JALAP, *jalapa*, in botany, a plant of the *pentandria-monogynia* class, called by Linnæus *mirabilis*. See MIRABILIS. Jalap-root is compact and firm, of a wrinkled surface, and of the deepest brown colour within, most disagreeable to the taste, and which takes fire most readily, and burns most briskly when held to the flame of a candle.

With us it is of use in extemporaneous prescription, given in the form of boluses and draughts. Its dose is from twenty to thirty or thirty-five grains. Its common correctives are ginger and cream of tartar; but nature has indeed prepared it so well to our hands, that it needs no addition. The best method of giving it is in a draught made with white-wine, and prepared at least twelve hours before the time when it is to be taken; in which case, the wine has power to open the body of the medicine, and prepare it for acting with the greater ease.

It is an excellent purgative in dropical and all other cases where ferous humours are to be evacuated. The only caution necessary in the use of it is, that it should not be given in acute fevers, nor to persons of dry and hot constitutions; for in these cases, it is liable to the same mischiefs as other acrid purgatives, and will sometimes bring on heat and inflammations in the viscera.

The preparations of jalap in use with us,

are a tincture, an extract, and a resin. To prepare the tincture, take of the root of jalap, eight ounces, put it into a quart of proof-spirit, and after digestion strain off the spirit.

This tincture purges briskly, and is of use in all cases where the root in substance is proper; its dose is from half a dram to two drams.

The extract is made thus: pour upon jalap-root powdered, rectified spirit of wine, and with a due heat draw a tincture, then boil the residue several times in water: after straining, draw off the spirit from the first tincture till it begins to thicken; inspissate also the strained decoctions; then mix the two extracts, and with a gentle fire reduce them to the consistence of a pill.

The two extracts will thus unite into an uniform mass, and retain all the virtues of the root. This extract is of the same virtue as the former tincture, and its dose is from ten to twenty grains.

To prepare the resin, take any quantity of the root of jalap well bruised, pour on it as much spirit as will rise four inches above the root; digest them in a sand heat till the tincture is extracted; filtrate the tincture; then distil off one half of the spirit; pour to what remains a sufficient quantity of water, and the resin of the jalap will be precipitated to the bottom in the form of turpentine. Wash it several times in fresh water, and dry it for use by a very gentle heat.

This purges the most violent of all the preparations of jalap; its dose is from ten to twelve grains; but the extract is greatly preferable to it on all occasions.

JALOFFS, a country and people of Africa, lying on the north side of the river Gambia, near its mouth: west long.  $14^{\circ}$ , north lat.  $13^{\circ} 40'$ .

JAM, or JAMB, among carpenters, &c. See the article JAMB.

JAMAGOROD, a town of the province of Ingria, in Russia, situated twelve miles south-east of Narva: east long.  $28^{\circ}$ , north lat.  $59^{\circ} 15'$ .

JAMAICA, an island of America, situated in the Atlantic ocean, between  $76^{\circ}$  and  $79^{\circ}$  of west longitude, and between  $17^{\circ}$  and  $18^{\circ}$  odd minutes north latitude, near 5000 miles south-west of England, 100 miles south of the island of Cuba, and 350 miles north of Terra Firma. The island lies east and west, and is about 140 miles long, and 60 broad. The wind sets on the shore almost all the day in every

every part of the island, and off the shore in the night ; it sometimes hails, but the people there never see frost or snow. The produce of the island is chiefly sugar, but there is plantations of coffee, of the cocoa or chocolate tree, of indico, tobacco, pepper, cotton, woods for dying, and the mahogany and machineel wood, ginger, medicinal drugs and gums. The common diseases of the country are fevers, fluxes, and the dry gripes.

JAMAICA-PEPPER, *pimenta*, or *pimenta*, in the materia medica. See PIMIENTA.

JAMAICA-WOOD, a name sometimes given to brazil. See the article BRAZIL.

JAMANA, the chief town of a province of Arabia, also of the same name : east long.  $47^{\circ} 15'$ , north lat.  $25^{\circ}$ .

JAMB, or JAUMB, among carpenters, an appellation given to door-posts, as also to the upright posts at the sides of window-frames.

JAMBS, among bricklayers, &c. denote the upright sides of chimnies, from the hearth to the mantle-tree.

JAMBA, a city of the hither India, and the capital of the province of the same name, situated 220 miles north-east of Delli : east long.  $82^{\circ}$ , north lat.  $31^{\circ}$ .

JAMBIC, in antient poetry, a sort of verse, so called from its consisting either wholly, or in great part, of iambus's. See the article IAMBUS.

Ruddiman makes two kinds of iambic, viz. dimeter and trimeter ; the former containing four feet, and the latter six. And as to the variety of their feet, they consist wholly of iambus's, as in the two following verses of Horace.

1	2	3	4	5	6
Dim.	Inar	fit æ	fluo	sius	
Trim.	Suis	æ	psaro	ma vi	rili us

ruit.  
Or, a dactylus, spondeus, anapæstus, and sometimes tribrachys, obtain in the odd places ; and the tribrachys also in the even places, excepting the last. Examples of all which may be seen in Horace, as :

Dimeter.					
1	2	3	4	5	6
Canidi	a tra	Etæ	vit	dapes	
Vide	re prope	rantes	domum		

Trimeter.

Quò quò|
 scèle| | sti rui| | tis au| | cur dex| | teris. || Prins| | que cæ| | lus si| | det in| | terius| | mari. |
| Aliti| | bus at| | que can| | bus homi| | cid bo| | etorem. |
| Parvum| | que lepo| | r aut ad| | venenam| | laqueo| | gruem. |

AMBOLIFERA, in botany, a genus of the *actandria-monogynia* class of plants,

the flower of which consists of four petals, and is of an infundibuliform shape.

JAMBUS, in antient poetry, a simple foot consisting of a short and a long syllable, as *pior*. See the article FOOT.

JAMBY, a town on the east side of the island of Sumatra, in the East Indies, situated in  $101^{\circ}$  east long. and in  $1^{\circ} 30'$  south lat.

JAMES, or *knights of St. JAMES*, a military order in Spain, first instituted about the year 1170, by Ferdinand II. king of Leon and Galicia. The greatest dignity belonging to this order is grand master, which has been united to the crown of Spain. The knights are obliged to make proof of their descent from families that have been noble for four generations, on both sides : they must also make it appear that their said ancestors have neither been Jews, Saracens, nor Heretics ; nor have ever been called into question by the inquisition. The novices are obliged to serve six months in the galleys, and to live a month in a monastery ; they observe the rule of St. Austin, making no vows but of poverty, obedience, and conjugal fidelity.

St. JAMES'S DAY, a festival of the christian church observed on the 25th of July, in honour of St. James the greater, son of Zebedee.

Epistle of St. JAMES, a canonical book of the New Testament, being the first of the catholic or general epistles ; which are so called, as not being written to one but to several christian churches.

This general epistle is addressed partly to the believing and partly to the infidel Jews ; and is designed to correct the errors, soften the ungoverned zeal, and reform the indecent behaviour of the latter ; and to confirm the former under the great hardships they then did, or shortly were to suffer, for the sake of christianity.

JAMES-TOWN, once the capital of Virginia in America, and of James-county, situated in a peninsula on the north side of James, or Pohatan river, in west long.  $76^{\circ} 30'$ , north lat.  $37^{\circ} 30'$ .

JAMPNUM, a word formerly used in fines of lands, &c. where it denotes gorsy ground ; it is supposed to be derived from the french *jaune*, yellow ; because the flowers of furze or gorse are of that colour.

JANEIRO, a province of Brazil, in south America, situated between  $44^{\circ}$  and  $49^{\circ}$  of west long. and between the tropic of capricorn and  $22^{\circ}$  of south lat.

JANIKAW,

**JANIKAW**, or **JANOWITS**, a town of Bohemia, situated forty-five miles south-east of Prague.

**JANITOR**, in anatomy, a name used by some affected writers for the pylorus. See the article **PYLORUS**.

**JANITRIX**, in anatomy, a name given to the vena portæ. See **VENA**.

**JANIZARIES**, an order of the turkish infantry, reputed the grand signior's guards, and the main strength of the ottoman army.

The janizaries were at first composed only of the sons of christians, delivered up as a tribute by their parents, in return for the privilege of enjoying liberty of conscience; and were taken at twelve years of age, to the end that forgetting their country and religion, they might know no other parent besides the sultan. Of late, however, this custom has been left off, the fine for the free exercise of their religion being generally paid in money. Their dress, which is given them by the grand signior every year, on the first day of ramazan, is a long vest with short sleeves, which they tie about their waists with a linnen-*dash* striped with many colours, and adorned at both ends with gold or silver fringe, and over this they wear a loose upper vest of blew cloth. They wear no turban, but instead of it a felt cap, and a long hood of the same stuff, which hangs over their shoulders; and on days of ceremony, they adorn themselves with long feathers stuck in a case in the front of their bonnets. The arms of the janizaries in Europe are, in time of war, a fusil, or a musquet, and a cartouch-box, which hangs at their left side: but in Asia, where powder and fire-arms are more scarce, they carry a bow and arrows with a poignard.

Their pay is from two alpers a day to twelve; for when they perform some important service, or have children, their pay is increased. All the turkish infantry are at present generally called by the name of janizaries, but such only are really so, who derive their institution from Ottoman I. and their peculiar privileges from Amurath III. which do not amount to above 25000 men: however, their being exempted from the payment of taxes, and the performance of public duties, induce abundance of persons to bribe the officers to take them under their protection, and to make them pass for janizaries, without receiving any pay. By means of this intermixture of

the real janizaries with those admitted by corruption, their number at present amounts to above 100,000. And yet not accounting any but such as are effectively janizaries, their body has sometimes been so formidable as to dethrone the ottoman monarchs, and suddenly to change the whole face of the empire.

**JANIZARIES** are also certain officers at Rome, otherwise called *participantes*. See the article **PARTICIPANTES**.

**JANSENISTS**, in church-history, a sect of the roman-catholics in France, who follow the opinions of Janſenius, bishop of Ypres, and doctor of divinity of the universities of Louvain and Douay, in relation to grace and predestination.

In the year 1640, the two universities just mentioned, and particularly father Molina and father Leonard Cellſus, thought fit to condemn the opinions of the jesuits on grace and free-will. This having set the controversy on foot, Janſenius opposed to the doctrine of the jesuits the sentiments of St. Augustine, and wrote a treatise on grace, which he entitled *Augustinus*. This treatise was attacked by the jesuits, who accused Janſenius of maintaining dangerous and heretical opinions; and afterwards, in 1642, obtained of pope Urban VIII. a formal condemnation of the treatise wrote by Janſenius: when the partisans of Janſenius gave out that this bull was spurious, and composed by a person entirely devoted to the jesuits. After the death of Urban VIII. the affair of janſenism began to be more warmly controverted, and gave birth to an infinite number of polemical writings concerning grace; and what occasioned some mirth, was the titles which each party gave to their writings: one writer published, *The torch of St. Augustin*, another found snuffers for St. Augustin's torch, and father Veron formed a gag for the janſenists, &c. In the year 1650, sixty-eight bishops of France subscribed a letter to pope Innocent X. to obtain an enquiry into, and condemnation of the five following propositions, extracted from Janſenius's *Augustinus*: I. Some of God's commandments are impossible to be observed by the righteous, even though they endeavour, with all their power, to accomplish them. II. In the state of corrupted nature, we are incapable of resisting inward grace. III. Merit and demerit in a state of corrupted nature, does not depend on a liberty which ex-

cludes



cludes necessity, but on a liberty which excludes constraint. IV. The semipelagians admitted the necessity of an inward preventing grace for the performance of each particular act, even for the beginning of faith, but they were heretics in maintaining that this grace was of such a nature, that the will of man was able either to resist or obey it. V. It is semipelagianism to say, that Jesus Christ died, or shed his blood, for all mankind in general.

In the year 1652, the pope appointed a congregation for examining into the dispute in relation to grace. In this congregation Janfenius was condemned, and the bull of condemnation, published in May 1653, filled all the pulpits in Paris with violent outcries and alarms against the heresy of the janfenists. In the year 1656, pope Alexander VII. issued out another bull, in which he condemned the five propositions of Janfenius. However, the janfenists affirm, that these propositions are not to be found in his book; but that some of his enemies having caused them to be printed on a sheet, inserted them in the book, and thereby deceived the pope. At last Clement XI. put an end to the dispute by his constitution of July 17, 1705; in which, after having recited the constitutions of his predecessors in relation to this affair, he declares, "That in order to pay a proper obedience to the papal constitutions concerning the present question, it is necessary to receive them with a respectful silence." The clergy of Paris, the same year, approved and accepted this bull, and none dared to oppose it.

This is the famous bull *unigenitus*, so called from its beginning with the words *unigenitus dei filius*, &c. which has occasioned so much confusion in France.

JANUARY, in chronology, the first month of the year, so called from Janus, one of the ancient roman deities, painted with two faces; one whereof was supposed to look towards the new year, and the other towards the old. See the articles YEAR, MONTH, &c.

JAPAN, or *islands of JAPAN*, are situated between 130° and 144° of east long. and between 30° and 40° north lat.

JAPAN-EARTH, *catechu*, in the materia medica. See the article CATECHU.

JAPANNING, the art of varnishing and drawing figures on wood, &c. in the manner as is done by the natives of Japan.

The method of preparing woods for japanning is as follows. 1. Take plasterer's size, dissolve it over the fire, and mix it with whiting finely powdered, till it is of a good body, but not too thick.

2. By means of a strong brush lay your work over with the former mixture, and letting it dry very well, repeat this till the wood is perfectly plain, or the pores and crevices sufficiently filled up; and when it is thoroughly dry, rub the work over with a wet rag till it is rendered as smooth as possible: this work is called water-planing. 3. After this, wash over the work with the thickest of seed-lac varnish till it is very smooth, letting it stand to dry between every washing. 4. In a day or two's time, you may varnish it over with black, or whatever other colour you design, and when it is dry, finish it by polishing. See the article VARNISH.

After the same manner carved figures are to be primed, also frames, cabinets, stands, tea-tables, &c. saving that these are not to be polished, and therefore do not require so great a body of varnish; but for the tops of tables, boxes, sides of cabinets, &c. when the wood is ordinary and rough grained, as deal, oak, &c. you may use common joiners glue dissolved in water till it is fine and thin, into which put the finest saw-dust, till it is indifferently thick: then with a brush lay your wooden-work over with it, and when it is dry, repeat it so often till all the roughness and grain of the wood is sufficiently hidden; and two or three days after let it be scraped with a scraper, as pear-tree and olive-wood are done, to make it as smooth as possible: then varnish it as before directed. This if well done might not come behind any other work either for beauty or durability; but, however, those woods that are firm and close-grained, are chiefly to be chosen.

Method of taking off japan patterns. 1. Having laid your ground, whether black, or of any other colour, and rendered it fit for drawing; and having your draught or design before you on paper, either drawn or printed, do as follows. 2. Rub this draught or print all over the back-side with whiting, or fine chalk; wiping off all that whiting which lies loose upon the paper, then laying this paper upon the table, or piece of varnished-work, with the whited side next it upon the very place where you would have that figure made, with a needle,

not sharp-pointed, fixed in a wooden handle, and called a tracing-pencil, go over and trace as much of the drawing as you think proper: thus, by means of the whiting, you will have the gross form of the draught, and such other lines as will be a direction to you how to perform what you would have done. 3. Having done this, if you draw in gold-size, use fine cinnabar mixt with gum-water, and with a small pencil dipt into it, go over all the lines made by the chalk: this will hold it so as not to come off. 4. If you work your metals or colours in gum-water, then trace over your design with gum-water mixt with gold or brass-dust, by either of these ways when it is dry and finished, viz. either in gum-water or gold-size, you may compleat and finish your work.

Method of japanning wood. The wood being prepared as before directed, it is japanned with black, as follows. 1. Take of the thickest lac-varnish, six ounces; and lamp-black, enough to colour it: with this wash over your piece three times, letting it dry thoroughly between each time: again, with the same varnish, wash it over three other several times, letting it dry as before, and rush it smooth between each washing. 2. Then take the following: of thickest seed-lac varnish, six ounces; and venice turpentine, one ounce; wash over your work with it six times, letting it stand twelve hours between the three first and the three last varnishes. 3. Your work being thus far done, take the following japan-varnish: of the finest seed-lac varnish, six ounces; of lamp-black, a sufficient quantity; mix them, and with that let your work be washed twelve times, standing twelve hours betwixt the first six and the last six washing. 4. Then letting it stand to dry for six or seven days, polish it with tripoli and a rag, as before directed: but in polishing you must work at it only till it is almost smooth, and then let it stand by for two days: afterwards polish it again, almost enough; then let it stand for six days, after which finish the polishing of it; finally, clear it up with oil and lamp-black, by which means you will have a good black japan scarce at all inferior to the true japan.

For a white japan. 1. Lay the ground with ising-glass size mixed with as much whiting scraped into it as will make it of a proper thickness; with this whiten your work once over, and being tho-

roughly dry, do it over again; and in like manner repeat it the third time; after which let it stand for twelve hours, covering it from dust; rush it with Dutch rushing as near the grain of the wood as is proper. 2. Then taking first ising-glass size, and flake white, so much as will make the size of a fair body, mix them well together, and with this go over your work three several times, letting it dry between each time, and rush it as before. 3. Then take white starch boiled in fair water, till it is somewhat thick, wash over the whole work twice with it, blood-warm; letting it dry as before. 4. Letting it stand for a day or two, it being first washed with redified spirit of wine, to clear it from the dust, dip a pure clean pencil into the finest white varnish, and do over the work six or seven times; and if this be well done, it will give a finer gloss than if it were polished: if it be not well done, polishing will be necessary, for which reason you must give it five or six varnishes more. In polishing you must make use of the finest tripoli; and instead of lamp-black and oil, must use putty and oil, and conclude with white starch mixed with oil.

Common red japan. 1. Take ising-glass size, fine vermilion, a sufficient quantity, as much as is proper; with the former mixture do your work over four times: first warming it by the fire, letting it dry each time, and rushing it as before. 2. This being done, wash it over eight times with ordinary seed-lac varnish, and let it by for twelve hours: then rush it again, but slightly, to make it lock smooth. 3. And, lastly, for an exquisite outward covering, wash it ten times with the best lac-seed varnish; let it lie seven days to dry, and then polish it with tripoli, and clear it up with oil and lamp-black.

A deeper red japan may be made by mixing fine sanguis draconis, in powder, with the varnish; and a pale red japan may be had by mixing so much white lead with it, as to make it, of whatever degree of paleness you please.

Blue japan. 1. Take gum-water what quantity you please, and a sufficient quantity of white lead; grind them well upon a marble; take ising-glass size what quantity you please, and of the finest and best smalt, a sufficient quantity; mix them well together; then add to them of the white lead, ground as before, so much

much as will give it a sufficient body; mix all together to the consistence of a paint. 2. Do your work over with this mixture three or four times, till you perceive the blue to lie with a good and fair body, letting it dry thoroughly between each time: if your blue is too pale, put more smalt among your size, without any white lead, and so *vice versa*.

3. Then rush it smooth, and go over it again with a stronger blue; and when it is dry, wash it three times with the clearest ising-glass size alone, and let it stand for two days to dry, covering it. 4. Warm your work gently at the fire, and with a pencil varnish it over with the finest white varnish, repeating it seven or eight times, letting it stand to dry two days as before. After which repeat again the washes seven or eight times in like manner. 5. Let it now stand for a week, and then polish it as before, and clear it up with lamp-black and oil.

**Chestnut-coloured japan.** Take indian red, grind it with ising-glass size upon a porphyry-stone, till they are as soft and as fine as butter: then mix a little white lead, which grind strongly; and, lastly, lamp-black, in due proportion.

**A tortoise-shell japan.** First lay a white ground, as before directed; then with proper colours, as vermilion, auripigment, &c. duly mixed with turpentine-varnish, streak and cloud or shadow the white ground with any irregular fancy at pleasure, in imitation of tortoise-shell: then let it stand to dry, and striking it here and there with reddish-yellow varnish, mixed with a little cinnabar, cloud the work up and down, touching it up also with varnish mixed with lamp or ivory-black. Having done this, varnish it five or six times over with the finest white varnish, letting it dry between every washing.

**Japanning with gold size.** The size being laid over that part only which you intend to gild, as already directed, let it remain there till it is so dry, that when you put your finger on it, it be glutinous and clammy, but not so moist that the particles should come off with your fingers. It is in this temper that the gold is to be applied: then take a piece of washing-leather, or the like, and wrapping it round your fore-finger, dip it in the gold-dust, and rub it where your gold-size is laid; for it will stick no where but on the size, and if any gold-dust lies about your work, brush it away with a

fine clean varnishing-brush. Then, with your pencil, draw that part with gold-size also which is designed for your copper, and letting it dry as in the former case, cover it over with copper-dust in the same manner. Having done this, lay your silver-size, and when it is dry, as before, lay on your silver-dust, as in the two former. But it is to be observed, that the metalline colours are to be laid successively one after another, letting each be covered and thoroughly dry before you enter upon a distinct colour. After all these, the other colours which are not metalline are to be laid on with gum-water, reserving the rock, &c. for the last part of the work. Let your size be of a due consistence, neither too thick nor too thin, that it may run smooth and clean. See the article **SIZE**.

**Japanning metals with gum-water.** Take gum-water, put it into a muscle-shell, with which mix so much of your metal or colour as may give it a proper consistence, so that it may run fine and smooth; having prepared and well mixed your metals and colours, lay on your design; your gum-water, being thoroughly dried, you are to run it over with fine seed-lac varnish, and afterwards polish and clear it.

**Laying speckles or strewings on japan work.** To do this, either on outside or inside boxes, drawers, &c. mix your speckles with ordinary lac-varnish, so much as may make it fit to work, but not so thick as for colour, and mix them well with a proper brush. Warm the work to be done gently by the fire, and with a pencil wash it over with the former mixture, and when it is dry repeat it again, and so often till your speckles lie as thick and even as you desire. When it is thoroughly dry, go over and beautify the work three or four times with seed-lac varnish mixt with turpentine, and so let it dry, and the work is finished, except you have a mind to polish it. But if you polish it, you must wash it eight or ten times over with the best seed-lac varnish, letting it stand to dry every time, and afterwards polish it, as before directed. All sorts of coloured speckles may be thus used, except those of silver, the laying on of which requires the best and finest of the lac-varnish, or the best white varnish, which must make it fit for polishing; but if you have not a mind to polish it, fewer washes of the varnish will be sufficient.

Japanned and laquered ware of the East Indies, pay duty for every 100l. gross value at the sale 38l. on importation, and the drawback is 35l. 12s. 6d. on exportation.

**JASMINE**, *jasminum*, in botany, a genus of the *diandria-monogynia* class of plants, the flower of which is monopetalous, with a long cylindraceous tube, and a plain limb, divided into five segments: the fruit is a smooth, oval, and bilocular berry, containing two large oblong seeds, covered with a membrane, and convex on one side and concave on the other. See plate CXLII. fig. 3.

According to Dale, the flowers of white jasmine are emollient, aperient, and heating; and with these intentions prescribed in difficult breathing, the cough, pleurisy, pain of the intestines, &c.

**Finnet leaved JASMINE**, the same with *quamoclit*. See *QUAMOCLIT*.

**Ilex-leaved JASMINE**, a plant otherwise called *lantana*. See *LANTANA*.

**Indian JASMINE**, a distinct genus of plants called by Linnæus *nyctanthes*.

**Red-JASMINE**, *plumeria*, in botany. See the article *PLUMERIA*.

**Scarlet-JASMINE**, the same with *bignonia*, or trumpet-flower. See *BIGNONIA*.

**JASMINOIDES**, a plant otherwise called *lycium*. See the article *LYCIUM*.

**JASMINOIDIS SPECIES**, the name used by Dillenius for the *cestrum*. See *CESTRUM*.

**JASPACHATES**, a name given by the antients to a species of agate, from its being truly a composition of agate and the genuine matter of jasper.

**JASPER**, in natural history, a genus of scrupi, of a complex irregular structure, of great variety of colours, and emulating the appearance of the finer marbles, or semipellucid gems.

The great characteristic of jaspers is, that they all readily strike fire with steel, and make not the least effervescence with aquafortis.

Jaspers, tho' commonly reckoned among the precious stones, ought undoubtedly to be ranged among the scrupi; being only opaque crystalline masses, variously defaced with an earthy admixture: and to this last ingredient it is that they owe all their variety of colours, as white, green, red, brown, and bluish.

The several kinds of nephritic stone, and the lapis divinus or jade, are all genuine jaspers; but the hard, bright, green jasper of the East Indies, seems to be the true medicinal kind. It is found in

masses of various sizes and shapes, but the more usual standard as to size, is between four and six inches in diameter; but there are masses of it found of a foot or more in diameter, and others no larger than a horse-bean. It is generally simple and unmixed; but if it be variegated at all, it is always with white, and this is disposed not in streaks or veins, but in clouds. It is capable of a very fine polish, and when the white clouds are well disposed, is very beautiful, and in pieces not too thick, is tolerably pellucid, when held up against the light.

It is recommended as an astringent, and ordered to be taken in powder against hæmorrhages of all kinds. The antients wore it as an amulet to prevent abortion, and tied it, on this occasion, to the belly of the person; and they were of opinion that it was able to stop hæmorrhages by being only worn on the arm. At present we give no credit to any thing of this marvellous kind, and consequently the virtues of this, as well as of the other semi-pellucid gems, is greatly out of repute.

**JASPI-CAMEA**, in natural history, the dull, broad-zoned, green and white cameo; being a very elegant species much resembling the common cameo in all things but colour. See *CAMEA*.

**JASPONYX**, in natural history, the purest horn-coloured onyx, with beautiful green zones, which are composed of the genuine matter of the finest jaspers. See the articles *JASPER* and *ONYX*.

**JASQUES**, a port-town of Persia, situated on the gulph of Ormus: east long. 58°, north lat. 25°.

**JATRALIPTA**, or *JATRALIPTES*, in grecian antiquity, an officer of the gymnasium, whose employment it was to appoint the *athletæ*.

**JATRALIPTES** is also an appellation given to physicians, who pretend to cure all diseases by external unctions.

**JATROPHA**, the *CASSADA-PLANT*, in botany, a genus of the *monœcia-polyandria* class of plants, the male flower of which is monopetalous, and of a saucer or funnel-like shape, with a very short tube, and the limb divided into five segments: the stamina are ten subulated filaments, alternately shorter: the female flower is roseaceous, consisting of five petals; and the fruit is a roundish, trilocular capsule, with a roundish seed in each cell. See the article *CASSAVA*.

**JAVA**, an island of the East Indies, situated

ated between  $102^{\circ}$  and  $113^{\circ}$  of east longitude, and between  $5^{\circ}$  and  $8^{\circ}$  of south latitude; being about 700 miles long from east to west, and one hundred broad.

*AVA the less*, or *BALLY*, a small island on the east of Java Major, and separated from it by a narrow channel.

*AVELIN, basta*, in antiquity, a sort of spear, five feet and an half long; the shaft of which was of wood, with a steel point.

Every soldier, in the roman armies, had seven of these; which were very light and slender.

*AUNDICE*, in medicine, a disease which is principally discovered by the yellow tincture of the skin, but most distinctly in the coats of the eyes, where it gives the first notice of its invasion.

The symptoms, according to Sydenham, are heaviness, inactivity, lassitude of the whole body, anxiety, uneasiness about the hypochondria, sickness at the stomach, oppression in the breast, difficult respiration, a dry and harsh skin, costiveness, hard white excrements, yellow high-coloured urine, which will tincture linnen or paper with a saffron hue: there is a bitter taste in the mouth, and all objects seem to be discoloured.

The immediate cause of a jaundice, says Towne, is an obstructed excretion of the bile from the vesicula fellea and liver into the duodenum, which being forced back upon the liver, mixes with the blood, by which it is carried into the whole body, whence the skin and urine will be tintured with the colour of the bile. See the articles *BILE* and *LIVER*.

This obstruction may be occasioned by any thing in the duct that plugs up the passage, or by external pressure which closes its mouth; or by spasms contracting the fibres thereof. Hence we may see why the jaundice succeeds the flatulent colic, why pregnant women are subject to it, and why spasms of hypochondriacal and hysterical persons produce the same effect. Sudden frights, the generation of too great plenty of bile, schirrous tumours, or ulcers of the liver, obstructions of the menses, obstinate intermitting fevers, and the bites of venomous animals, will also produce this disease.

Hoffman thinks emetics highly proper in the cure of a jaundice, if the disease does not proceed from violent anger, spasms of the stomach, a cardialgia, a spasmodic colic, or a stone lodged in the cystic

duct, exciting a violent uneasiness about the precordia; and that when a bilious fordes lodging in the duodenum, and closing up the orifice of the ductus choledochus intercepts the passage of the bile, or when a tenacious, moveable, and not highly concreted bilious matter plugs up the hepatic ducts, emetics are of singular efficacy in evacuating it. A scruple of ipecacuanha, with a grain of tartar emetic, will be a proper dose; or two grains of tartar emetic in a draught of generous wine, or in an infusion of manna, drinking water-gruel after it.

In this case, Huxham, after emetics, thinks cathartics will be proper, compounded of aloetics and mercurials. Then saponaceous attenuants, preparations of tartar, and volatiles, and last of all chalybeats; but the last are not to be given till the humours are sufficiently attenuated, otherwise an incurable schirrus of the liver may ensue. He also recommends the terra foliata, otherwise called tartarum regeneratum, and, by the college, sal diureticus, as the greatest dissolvent and the most powerful remedy in this disease. Its dose is from five grains to a scruple, and upwards.

Saponaceous medicines are often given with the same intention in this disease with success, thus: take castile soap, three ounces; powder of the rhapontic plant, and species of hiera picra, of each half an ounce; as much of the syrup of orange-peel as is sufficient to make an electuary, of which the patient is to take from half a dram to a whole dram twice a day. After some time, with the above precaution, may be added half an ounce of steel-filings: or take gum ammoniac, two drams; powder of squills, one dram; castile soap, three drams; and a sufficient quantity of white sugar: make ten pills out of every dram, three of which are to be taken every morning, and as many at night going to bed.

These are attenuants which should be preceded with gentle purgatives; for Hoffman affirms, that all drastic purgatives are prejudicial, as they increase spasms, throw the blood into violent commotions, and impair the strength: therefore, besides these which Huxham has directed above, the following formula may be sometimes proper. Take of good rhapontic powder, half a dram; cream of tartar, one dram; simple cinnamon-water, three ounces, and syrup of roses, two drams, for a draught.

When a jaundice succeeds the colic, Sydenham is of opinion that all purgatives are to be omitted, rhubarb only excepted; and this is not to be prescribed without evident reason: but if the jaundice comes on without any preceding colic, then the purgatives already mentioned may be given; and if the disease does not yield to this method, the doctor is of opinion that chalybeate waters will be proper.

In a stubborn jaundice, Allen recommends æthiops mineral.

When a jaundice is attended with a hæmorrhage, it is always dangerous in the opinion of Huxham, because it denotes a most acrimonious and dissolved state of the blood; in which case he thinks attenuants, aloetics, volatiles, and chalybeats, little better than poison; whereas acids, diluents, demulcents, and mineral waters, are very beneficial. Hemp-seed boiled in milk till it breaks, is often advantageous: the dose is five ounces twice a day. Or an emulsion of white poppy-seeds and sweet almonds after moderate bleeding, if the patient is feverish, and the pulse will allow it, and gentle purging.

Sylvius observes that many children are afflicted with this distemper soon after they are born, and that some are often born with it. It is his opinion, that this disease may often arise, without any obstruction of the biliary duct.

The remedies, which cure the jaundice, are not so safely given to children as to adults; however, the following powder, given in the nurse's milk twice or three times a day, seldom fails of curing this disease in children. Take english saffron and bezoar mineral, of each one grain; and being beat to powder, let them be mixed. When the body is bound, the best purgative is rhubarb, and particularly the syrup of succory with rhubarb.

**JAU-RAIA**, in botany, the same with the *rajania* of Linnaeus. See **RAJANIA**.

**JAW**, *maxilla*, in anatomy. See the article **MAXILLA**.

In fractures of the lower jaw, after the patient is commodiously seated against the light, and his head held firm by an assistant, the surgeon is to introduce the thumb or fore-finger of one hand into his mouth, applying his other hand externally; and by this means, to press the fragments of the jaw on each side, till they have regained their former situation, which may be known by the re-

gular disposition of the teeth. When properly reduced, they must be covered internally first with a plaster, and then a compress dipt in spirit of wine; and another compress, sewed to a piece of paste-board in the form of a half jaw, is to be laid on externally. These are to be kept on by the bandage with four heads, perforated in the middle to let in the chin. But whenever the jaw is found to be fractured on both sides, it is usual to apply internally, after the compress dipt in spirit of wine, another made of thin paste-board, perforated in the middle, and accommodated to the figure of the chin. The patient should live upon broths and soups, and avoid all talking, till the jaw is grown firm; and at the same time take care not to lie flat either on the back or face.

The lower jaw is indeed seldom luxated, because held very firm by strong ligaments and muscles; but when this happens, whether from a blow, or by opening the mouth too wide in yawning, the chin is distorted on the opposite side, and the mouth gapes open; and when luxated on both sides, then the mouth not only gapes open, but the chin also hangs down. When the luxation is only on one side, the cure is usually not so very difficult; but when both heads are dislocated, and not properly restored to their places, it always occasions the worst of symptoms, as violent pains, inflammations, convulsions, fevers, vomitings, and at length death. But if an expert surgeon comes in time, the luxation is not very difficult to reduce.

When this happens, the patient is to be directly seated on a low stool, so that an assistant may hold his head firmly back against his breast; then the surgeon is to thrust his two thumbs as far back into the patient's mouth as he well can; but they are to be first wrapped round in a handkerchief, to prevent them from slipping or being hurt; and his other fingers are to be applied to the jaw externally: when he has got firm hold of the jaw, it is to be strongly pressed, first downwards, then backwards, and lastly upwards, but so as that all may be done in an instant, by which means the elapsed heads of the jaw may be easily shoved into their former cavities: but the surgeon ought to be always careful to snatch his thumbs quickly out of the patient's mouth, lest they should be compressed, bruised or bit, by reducing the jaw into its place.

If the jaw be out on one side only, every thing is to be done in the same manner; only observing that the luxated side is to be forced more strongly downwards and backwards than the sound one. As for bandages, there seems no great occasion for them in this case, unless the luxation has remained some time before it was reduced; for then it may not be improper to apply, for several days, the four-headed bandage, with some strengthening spirit, which may be taken off when the patient intends to eat.

**JAWER**, a city of Silesia, capital of the dutchy of Jawer, situated in  $16^{\circ} 12'$  east long. and  $51^{\circ} 8'$  north lat.

**JAZY**, a city of european Turkey, capital of Moldavia, situated on the river Pruth, in east long.  $28^{\circ} 40'$ , north lat.  $47^{\circ} 15'$ .

**IBERIA**, the antient name of Spain, as well as of Georgia in Asia.

**IBERIS**, **SCIATICA-CRESS**, in botany, a genus of the *tetradynamia filiculosa* class of plants, the corolla whereof consists of four unequal petals, vertically oval, obtuse, and patent; the fruit is a little pod erect, roundish, compressed, surrounded by an acute bifid margin on the upper side, and containing two cells: the seed, in each cell, is single and roundish.

**IBEX**, in zoology, an animal of the goat-kind, with extremely long nodose horns, which bend backwards, and are of a blackish colour, and annulated on the surface. The body is of a dark dusky colour, and is less in proportion to the height than that of the common goat: it has a great resemblance to the deer-kind; the legs are also perfectly like those of the deer, straight, elegant, and slender. It is frequent in many parts of Europe, and, notwithstanding its vast horns, runs and leaps with surprising force and agility. See plate CXLII. fig. 4.

**IBIS**, a bird which was very useful to the Egyptians for destroying serpents, locusts, and caterpillars; and, on that account, had divine honours paid it. It is all over black, and about the size of the curlew, with the head of a cormorant, and the long neck of a heron.

**IBURG**, a town of Westphalia, in Germany, twelve miles south of Osnabrug.

**ICE**, *glacies*, in physiology, a solid, transparent, and brittle body, formed of some fluid, particularly water, by means of cold. See **FROST** and **FREEZING**.

The younger Lemery observes, that ice is only a re-establishment of the parts of water in their natural state; that the

mere absence of fire is sufficient to account for this re-establishment; and that the fluidity of water is a real fusion, like that of metals exposed to the fire; differing only in this, that a greater quantity of fire is necessary to the one than the other. Gallileo was the first that observed ice to be lighter than the water which composed it: and hence it happens, that ice floats upon water, its specific gravity being to that of water as eight to nine. This rarefaction of ice is owing to the air-bubbles produced in the water by freezing; and being considerably large in proportion to the water frozen, render the body so much specifically lighter: and these air-bubbles growing large, acquire a great expansive power, so as to burst the containing vessels, though ever so strong. It has been imagined, that this bursting of the vessels by frozen water, was owing to the contraction of the solid parts of the vessel upon the ice, and not to the internal expansion; but the florentine academicians shewed the contrary by the following experiment: they filled a hollow globe of pure gold with cold water, then, soldering up the orifice, exposed it to a freezing air; having first fitted to it a metallic ring, somewhat less than a great circle of the sphere, and carefully marked the part of the sphere where the edge of the ring touched it. While the water froze in the globe, they observed the external surface to be so much enlarged, that the metallic ring remarkably ascended towards the vertex from the greatest horizontal circle: whence the globe expanded much more than the ring contracted by the cold; as was plain from comparing this ring with another, originally made of the same size.

But snow-water, or any water long boiled at the fire, freezes slower, and affords a more solid ice, with fewer bubbles, than other water not so treated. And pure water long kept in vacuo, and froze afterwards there, freezes much sooner with the same degree of cold, than water unpurged of air, and exposed to the atmosphere; whilst ice thus made of water from which the air was extracted, is much harder, more ponderous, equable, and transparent than common ice. Whence it is certain, that the air naturally contained in water, being brought together by the freezing cold, occasions its greater rarefaction and levity: and in this manner ice has been procured, that would not float upon water. If finely powdered

ed sea-salt, sal gem, or sal ammoniac be put to powdered ice or snow, in a freezing season, and they be well mixed together, the salts will immediately begin to dissolve, and the coldness grow much more intense; and this, so far as we yet know, to a certain degree, whatever were the degrees of cold in the bodies before their mixture. Alcohol also being thus mixed with ice, increases its coldness: the pure, saline, and acid spirits of sea-sal, nitre, aqua fortis, and aqua regia, the stronger they are, the more intense cold they produce when mixed with ice.

Hence, to make the most perfect ice, we should take the purest water, and perfectly purge it of air by the air-pump, and then freeze it in the severest frost: thus we shall obtain ice of the greatest hardness, density, purity, transparency, and gravity; the true physical characters of ice to the senses: tho' even this ice, so far as we now know, would immediately melt into water with a heat of thirty degrees. Whence it follows, that the most natural cold cannot convert pure water into stone, crystal, or gems; for this artificial cold is above forty degrees stronger than that, where water is said to be frozen into rock-crystal: for by all the experiments that have been made, no increase of cold has made ice at all more difficult to melt than common ice.

**ICE-HOUSE**, a building contrived to preserve ice for the use of a family in the summer-season.

Ice-houses are more generally used in warm countries, than with us, particularly in Italy, where the meanest person who rents a house, has his vault or cellar for ice. However as ice is much more used in England than it was formerly, it may not be amiss to give some directions for the choice of their situation, for the manner of building them, and for the management of the ice.

As to the situation, it ought to be placed upon a dry spot of ground; because wherever there is moisture, the ice will melt: therefore in all strong lands which retain the wet, too much pains cannot be taken to make drains all round them. The place should also be elevated, and as much exposed to the sun and air as possible.

As to the figure of the building, that may be according to the fancy of the owner; but a circular form is most proper for the well in which the ice is to be preserved, which should be of a size and

depth proportionable to the quantity to be kept; for it is proper to have it large enough to contain ice for two years consumption, so that if a mild winter should happen, in which little or no ice is to be had, there may be a stock to supply the want. At the bottom of the well there should be a space of about two feet deep, left to receive any moisture that may drain from the ice; over this space should be placed a strong wooden grate, and from thence a small drain should be laid under ground, to carry off the wet. The sides of the well should be built with brick, at least two bricks thick; for the thicker it is, the less danger there will be of the well being affected by any external cause. When the well is brought up within three feet of the surface, there should be another outer-arch or wall begun, which should be carried up to the height of the top of the intended arch of the well; and if there be a second arch turned over this wall, it will add to the goodness of the house: the roof must be high enough above the inner arch to admit of a doorway to get out the ice. If the building is to be covered with slates or tiles, reeds should be laid considerably thick under them, to keep out the sun and external air; and if these reeds are laid the thickness of six or eight inches, and plastered over with lime and hair, there will be no danger of the heat getting thro' them. The external wall may be built in what form the proprietor pleases; and as these ice-houses are placed in gardens, they are sometimes so contrived as to have an handsome alcove-seat in front, with a small door behind it, through which a person might enter to take out the ice; and a large door on the other side, fronting the north, with a porch wide enough for a small cart to back in, in order to shoot down the ice near the mouth of the well, which need not be more than two feet diameter, and a stone so contrived as to shut it up in the exactest manner: all the vacant space above and between this and the large door should be filled up with barley-straw. The building thus finished, should have time to dry before the ice is put into it.

It is to be observed that upon the wooden grate, at the bottom of the well, there should be laid some small faggots, and if upon these a layer of reeds is placed smooth for the ice to lie upon, it will be better than straw, which is commonly used. As to the choice of the ice, the thinner



thinner it is, the easier it may be broken to powder ; for the smaller it is broken, the better it will unite when put into the well. In putting it in, care must be taken to ram it as close as possible ; and also to allow a vacancy of about two inches, all round, next the side of the well, to give passage to any moisture occasioned by the melting of some of the ice. When the ice is put into the well, if a little salt-petre be mixed with it at every ten inches or a foot in thickness, it will cause it to unite more closely into a solid mass. *Miller's Gard. Dict.*

**ICH DIEN**, the motto of the prince of Wales's arms, signifying, in the high dutch, *I serve*.

It was first used by Edward the black prince; to shew his subjection to his father king Edward III.

**ICHNEUMON**, in zoology, the name of the bluish meles, with uniform claws. See the article **MELES**.

This animal is truly of the badger-kind, and indeed very much resembles the common badger in almost every particular. It is about the size of a large cat; the head is of a blue colour, approaching to black, especially about the nose; and all the rest of the body is of a grey colour, like that of our common badger, the under part being darker than the back or sides.

**ICHNEUMON** is also the name of a genus of flies, of the hymenoptera order, with a triple sting at the anus.

**ICHOGRAPHY**, in perspective, the view of any thing cut off by a plane parallel to the horizon, just at the base of it.

Among painters it signifies a description of images, or of antient statues of marble and copper, of busts and semi-busts, of paintings in fresco, mosaic works, and antient pieces of miniature.

**ICHOGRAPHY**, in architecture, a description or draught of the platform or ground-work of a house, or other building. Or it is the geometrical plan or platform of an edifice or house, or the ground-work of a house or building, delineated upon paper, describing the form of the several apartments, rooms, windows, chimnies, &c. See the article **BUILDING**.

The drawing or designing of this is properly the business of the master architect, or surveyor; it being, indeed, the most difficult of any.

**ICHOGRAPHY**, in fortification, denotes the plan or representation of the length and breadth of a fortress, the distinct parts

of which are marked out, either on the ground itself, or on paper.

**ICHOGLANS**, the grand signior's pages, serving in the seraglio.

Those are the children of christian parents, either taken in war, purchased, or presents from the viceroys and governors of distant provinces: they are the most sprightly, beautiful, and well made that can be met with; and are always reviewed and approved of by the grand signior himself, before they are admitted into the seraglios of Pera, Constantinople, or Adrianople, being the three colleges where they are educated, or fitted for employments, according to the opinion the court entertains of them.

**ICHOR**, properly signifies a thin watry humour, like serum; but is sometimes also used for a thicker kind, flowing from ulcers, called also sanies.

**ICHTHYOCOLLA**, **ISINGLASS**, in the materia medica, &c. a preparation from the fish known by the name of huso. See the article **HUSO**.

This is a tough and firm substance, of a whitish colour, and in some degree transparent; it is light, moderately hard, very flexible, and of scarce any smell, and very little taste. We usually receive it in twisted pieces of an oblong and rounded figure, and bent in the shape of a horse-shoe: this our druggists usually beat and pull to pieces, and sell it in thin shreds like skins, which easily dissolve: besides this kind of round isinglass, we meet with some in small thin square cakes, white and very transparent; these are the finest of all. But isinglass, of whatever shape, is to be chosen clean, whitish, and pellucid.

The method of preparing the ichthyocolle is this: they cut off all the fins of the huso, close to the flesh, and take out the bladder, stomach, and intestines; they wash these very clean, and then cut them in pieces, and throwing them into a large quantity of water, they let them steep four and twenty hours, and after this they kindle a fire under the vessel, and keep the liquor just boiling till the greater part of the matters are dissolved; they then stir the whole briskly about; then strain it through flannels, and let the liquor by to cool. When there is a large quantity of fat usually formed upon it, which is carefully skimmed off, and the clear liquor is poured off from the grosser parts which subside, it is put over the fire again, and gently evaporated and skim-

ed afresh, all the time, till by trials they find, that, on letting a spoonful of it cool, it will harden into the consistence of glue. Great care is taken to keep the fire very gentle, to prevent burning towards the end of this evaporation. They then pour it out upon a large, smooth, wooden table; and as it cools, form it into the masses we meet with it in, by cutting and rolling it up.

The greatest quantity of isinglass is made in Russia. We have it principally from Holland, the Dutch contracting for the most of it, before it is made.

It is an excellent agglutinant and strengthener, and is often prescribed in jellies and broth, but rarely enters any compositions of the regular medicinal form. It is the most efficacious as well as the most safe and innocent of all the ingredients used for cleaning wines, upon which account the wine-coopers use a much greater quantity of it than the apothecaries.

A very valuable glue is also made of this drug, which is a proper form to keep it for the wine-coopers use.

**ICHTHYOLOGY**, *ἰχθυολογία*, the science of fishes, or that branch of zoology which treats of fishes. See the article **FISH**. Artedi defines ichthyology to be the science or art of distinguishing all the parts of fishes, and calling them by their proper names; also of giving every fish its generic and specific name; and lastly, to commemorate some of its remarkable qualities. See plate CXLIII.

We have already, under the article **FISH**, given the general distribution of fishes into the classes of plagiuri, chondropterygious, branchiostegious, acanthopterygious, and malacopterygious fishes, with the peculiar characters of each class; and in the annexed Plate of Ichthyology, there is delineated a fish of each class, in the order above mentioned.

As to the plagiuri, or cetaceous fishes, they agree in many particulars with hairy quadrupeds, and are distinguished into genera by much the same characters, especially the teeth; but besides these, the number of fins is also of use in arranging them into distinct genera.

The chondropterygious or cartilaginous fishes differ from each other in the figure of their whole body, the number of foramina or apertures of the gills, &c. by which they are most commodiously subdivided into genera; since the characters of

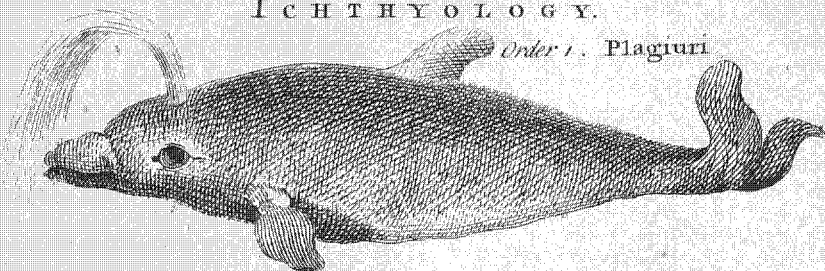
the first class are here so various as to differ in the different species of the same genus. The characters by which these two classes of fishes may be subdivided into distinct genera, are simple and obvious: but it is a matter of greater difficulty to fix upon invariable characters, by which the other classes may be subdivided in the same manner. The multitude of genera contained under each of them, added to the great resemblance to be found between really distinct genera, make it no easy task to distinguish these genera from each other, which is best done by establishing the generical characters upon such external parts as are most constant and uniform in the same genus, and least common to other genera.

From many instances produced by Artedi, it appears, 1. That the figure of the fins and tail is of no use in determining the genera of these fishes. 2. That the figure of the back, breast, and belly, and even of the whole body, with respect to length and breadth, is of no service for establishing generical distinctions. 3. That the figure of the head, mouth, eyes, nostrils, and other parts belonging to the head, is indeed of the utmost consequence in distinguishing the different genera; but as this figure is common to several otherwise distinct genera, it is rather serviceable in establishing the orders, than genera of fishes. 4. The same may be observed of the figure of the scales, and the situation of the several external parts of fishes, as the mouth, nostrils, eyes, fins, &c. these, though of great use in the description of fishes, afford no distinctive characters of the genera, as being common to several. 5. Neither is the number of fins or teeth to be reckoned a generical character; since this varies in fishes undoubtedly of the same genus.

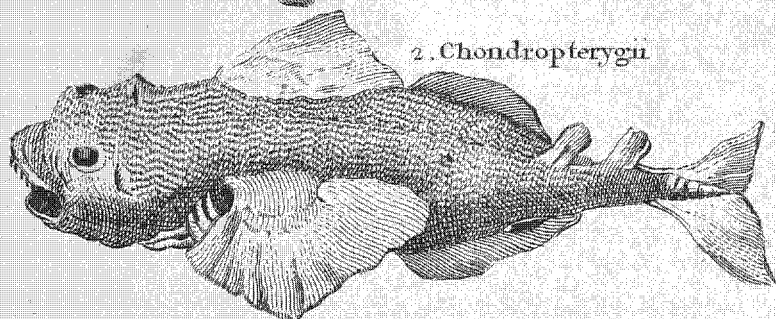
Having thus shewn what properties of fishes are not, he next considers those which are sufficient generical characters; and observes, that of all the external parts, the only ones to be found in all the spinose fishes, and yet different in each genus, are the little bones of the membrana branchiostega, or membrane of the gills. These bones are found in almost all fishes that have bones, though more conspicuous in some than in others, by reason of the different thickness of the membrane; and the number of them is more constant in the same genus, than that of the fins: thus, all the gadi have constantly

ICHTHYOLOGY.

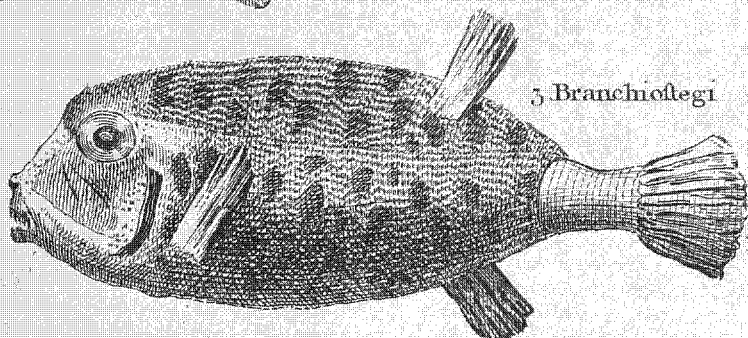
Order 1. Plagiuri



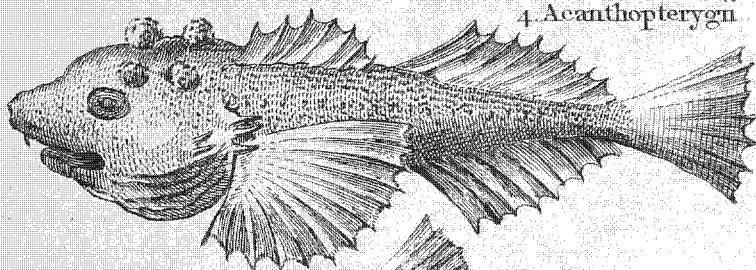
2. Chondropterygii



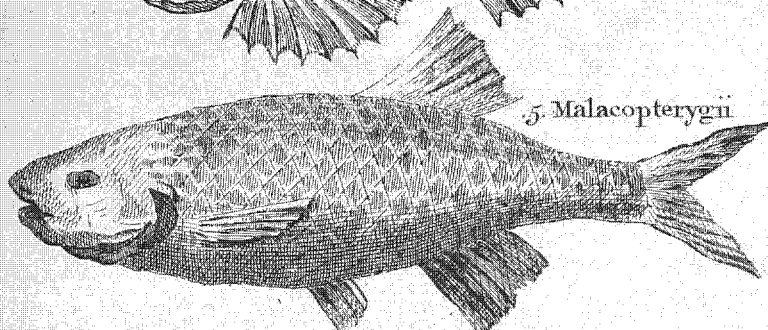
3. Branchioptegii



4. Acanthopterygii



5. Malacopterygii





constantly seven of these little bones in the branchiostege membrane of each side; all the species of perch have likewise seven; the cyprini, three; the cotti, six; the clupeæ, eight; the efoces, fourteen; and so of others. There are only two known genera of spinose fish, wherein the number of these bones is not the same in all the species of the same genus, *viz.* the salmon and coregonus; these bones in different species of salmon being ten, eleven, and twelve; and in the different species of coregonus, seven, eight, nine, and ten: and it is very remarkable, that this difference only takes place in fishes, the species of which are so very like each other, as to be known to belong to the same genus at first sight.

Hence it follows, that the number of these little bones in the branchiostege membrane affords the first and most essential character for distinguishing the genera of cateturous and osteopterygious fishes. This however is not sufficient alone; it being also necessary, besides the same number of these bones in the membrane of the gills, 1. That the fishes belonging to each genus, should have the same external figure. 2. That the situation, no less than the number of their fins, be the same. 3. The teeth should also have the same situation. 4. The disposition of the scales should also be the same. 5. The figure and disposition of the other external and internal parts, particularly of the stomach and its appendices, the intestines, air-bladder, &c. should also agree.

If these characters are found to correspond, there can be no doubt but the genus founded on them is just and natural. However, it must be observed, that these characters are not to be expected in full perfection in all the fishes belonging to one and the same genus. But three of these, *viz.* the same number of bones in the branchiostege membrane, the same external figure, and the same disposition of the fins, are essential to the sameness of the genus; the other characters being only additional to these.

**ICHTHYOLOGIST**, an author who has written professedly of fishes.

Ichthyologists are very numerous; but those who have treated this subject with most accuracy and judgment, are Aristotle, Bellonius, Rondeletius, Salvian, Gesner, Willughby, Ray, and Artedi; especially this last author, who is universally acknowledged to be the best on this

subject; and next to him come Willughby and Ray.

**ICHTHYPERIA**, in natural history, a name given by Dr. Hill to the bony palates and mouths of fishes, usually met with either fossil, in single pieces, or in fragments. They are of the same substance with the bufontæ, and are of very various figures, some broad and short, others longer and slender; some very gibbous, and others plainly arched. They are likewise of various sizes, from the tenth of an inch to two inches in length, and an inch in breadth. See **BUFONITÆ**.

**ICHTHYS**, *ἰχθυς*, in antiquity, a celebrated acrostic of the erythræan sibyl, the first words of each verse of which were, *Ἰησὺ Χριστὸς Θεοῦ υἱὸς σωτὴρ*, that is, *Jesus Christus Dei filius servator*; and the initial greek letters form the word *ἰχθυς*, whence the name.

**ICKWORTH**, a town of Suffolk, six miles east of St. Edmundsbury.

**ICONIUM**, the same with Cogni. See the article **COGNI**.

**ICONOCLASTS**, *εικονοκλασταί*, in church-history, an appellation given to those persons, who, in the VIIIth century, opposed image-worship; and is still given by the church of Rome, to all christians who reject the use of images in religious matters. See the article **IMAGE**.

**ICOSAHEDRON**, in geometry, a regular solid, consisting of twenty triangular pyramids, whose vertexes meet in the center of a sphere, supposed to circumscribe it; and, therefore, have their height and bases equal: wherefore the solidity of one of those pyramids multiplied by 20, the number of bases, gives the solid content of the icosahedron.

If fig. 1. n<sup>o</sup> 1. plate CXLIV. be nicely drawn on pasteboard, cut half through, and then folded up neatly together, it will represent an icosahedron. *ibid.* n<sup>o</sup> 2.

**ICOSANDRIA**, in the linnæan system of botany, a class of plants, the twelfth in order, the characters of which, in so far as it differs from the *polyandria*, are these; the cup of the flower is monophyllous and hollow, with the corolla affixed by the unguis to its sides, and about twenty stamina inserted either into the side of the cup, or corolla. See the article **BOTANY**.

The term *icosandria* is here taken in a lax and indeterminate sense, so as to comprehend all plants with more than twelve stamina, and for the most part not

much exceeding twenty. However, the characteristic of the class is rather to be taken from the manner of insertion, than number of the stamina.

To this class belong the cactus or torch-thistle, the amygdalus or almond-tree, the cerasus, or cherry, &c. See the articles CACTUS, ALMOND, &c.

**ICTERIC DISEASE**, the same with the jaundice. See the article JAUNDICE.

**ICTIAR**, in the turkish affairs, an officer who has gone through all the degrees of preferment in his respective body, and consequently has a right to a seat in the divan. See the article DIVAN.

**IDA**, a mountain in the island of Candia or Crete; also another in Natolia, or lesser Asia, celebrated by the poets for the judgment of Paris on the beauty of the three goddesses, Minerva, Juno, and Venus, to the last of whom he gave the preference.

**IDANHA VELHA**, a city of Portugal, in the province of Estremadura, forty-six miles north-east of Portalegre.

**IDEA**, in general, the image or resemblance of a thing, which, though not seen, is conceived by the mind. See the article IMAGE.

In logic, idea denotes the immediate object about which the mind is employed, when we perceive or think of any thing.

To account for the formation of our ideas, it is obvious, that the first thing we perceive, in taking a view of what passes within us, is, that we receive impressions from a variety of external objects; that distinct notices are thereby conveyed into the understanding, and that we are conscious of their being there. This attention of the mind to the object's acting upon it, is by logicians called simple apprehension. It is therefore by this means that we come to be furnished with all those ideas about which our thoughts are employed. For when we look at the sun, moon, a man, a tree, or any other object without us, the image or appearance thereof is immediately conveyed to the soul by the organ of sight; and these images the mind has a power or faculty of renewing or calling up again to its view at pleasure, even when the objects that first produced them are removed. Now our ideas are nothing else than these renewed representations of what we have at any time perceived or felt, by means of which things are again brought under the view of the mind; and by variously

combining these ideas together, the mind can upon many occasions form to itself representations even of things that never perhaps had any real existence in nature, as mountains of gold, &c.

As to the origin or source of our ideas, it is to be observed, that they all have their first rise, and are derived into the understanding, either from the senses, or reflecting upon what passes within ourselves; or, to speak in the language of logicians, from sensation or reflection. From these two great inlets of knowledge the understanding is supplied with all the materials of thinking. For outward objects acting upon our senses, rouse in us a variety of perceptions, according to the different manner in which they affect us; and it is thus that we come by the ideas of light and darkness, heat and cold, sweet and bitter, rough and smooth, and all other impressions which are termed sensible qualities, and which are wholly derived to us from without, and are as numerous as the outward objects that produced them, and the different ways in which our senses are affected by them. This inlet to knowledge, as comprehending all the notices conveyed into the mind by the impulses of external objects upon the organs of sense, is called sensation. But there is yet another source of impressions arising from the attention of the mind to its own acts, when it takes a view of the perceptions lodged there, that were originally furnished by the senses. For these giving the mind an opportunity of exerting its several powers, when we turn the eye of the soul inwards upon them, and take a view of the various ways in which it employs itself about them, we find all our thoughts under whatever form they appear, are attended with consciousness, and that the understanding is enriched with a new set of perceptions no less distinct than those conveyed in by the senses. It is thus that we come by the ideas of perceiving, thinking, doubting, remembering, willing, &c. which are the different acts and workings of the mind itself, represented to us by our own consciousness of what passeth within us. This second source of ideas is called reflection, and presupposes sensation. Besides these two sources there are other ideas derived into our understandings by all the ways of sensation and reflection, as the ideas of pleasure, pain, power, existence, unity, succession, &c. See SENSATION and REFLECTION.

From

From these simple beginnings, all our knowledge, all our discoveries, take their rise ; for we can have no perception of the operations of our minds, until they are exerted ; nor can they be exerted before the understanding is furnished by the senses with the ideas about which to employ them ; as therefore these ideas that give the first employment to our faculties are evidently the perceptions of sense, it is plain that all our knowledge must begin here. Nor shall we among all our discoveries, or that infinite variety of conceptions whereof they consist, be able to point out one original idea, which is not derived from sensation or reflection, or one complex idea that is not made up of those original ones. This will appear more obvious, if it is considered, that to such as are destitute of any of the inlets by which the perceptions of sense are usually admitted, all the ideas thence arising are absolutely lost ; for a blind man can have no idea of light or colours, nor a deaf man form any conception of sound ; and the same may be said of the other senses. Hence it follows, that the mind in the reception of all ideas by sensation is wholly passive, and the perceptions produced correspond to the impressions made upon it, are just as nature furnished them, and have no dependence on our will. For when we see a tree, a house, a man, or any other object, they necessarily appear each under its proper form, nor is it in our power to receive from them other ideas than they are fitted to produce.

In tracing the progress of the mind further, we find by experience, that being thus provided with its original characters and notices of things, it has a power of combining, modifying, comparing and examining them in an infinite variety of lights ; by which means it is enabled to enlarge the objects of its perception, and thereby to acquire an inexhaustible treasure of other ideas, distinct from the former, though resulting from them ; and by the various comparison of its ideas according to such combinations of them as best suits its ends, to exert itself in acts of judging and reasoning, and to push on its views of things from one discovery to another ; and thus we see the progress of the soul in its advances to knowledge from the first dawning of perception. See KNOWLEDGE. Ideas are variously divided by logicians, but the most natural as well as most use-

ful division of them is into simple and complex ideas ; as this division not only comprehends our ideas in all their varieties, but suggests and represents to us the manner and order in which they are introduced into the mind.

Simple ideas, are such of our perceptions, or original notices of things, as are conveyed into or exist in the mind under one uniform appearance, without variety or composition, and are not distinguishable into different ideas. Under this head are included all those ideas that come into the mind by sensation ; for tho' external objects convey at once into the understanding many different ideas all united together, and making as it were one whole, and tho' the qualities of bodies that affect our senses are in the things themselves so mixed and united, that there is no separation between them ; yet the ideas they produce in the mind are simple and unmixed, and are conceived each under a form peculiar to itself, which cannot be divided into two or more different ideas. Thus the ideas of colour, extension and motion, may be taken in at one and the same time, from the same body ; yet these three perceptions are as distinct in themselves, as if all proceeded from different objects, or were exhibited to our notice at different times. Again, some of our simple ideas we acquire purely by means of one sense ; as the ideas of colours and sounds, by the eyes and ears ; of tastes and smells, by the palate and nose ; rough and smooth, by the touch : others we gain by several senses, as space, extension, figure, &c. others again of our simple ideas are suggested to us by the attention of the mind to what passeth within itself, or reflection only, as our ideas of consciousness, perception, volition ; others by sensation and reflection jointly, as those of pain, pleasure, power, existence, unity, &c.

Of simple ideas, it is proper to observe, 1. That they are such as can only be conveyed into the mind, by the proper channels or avenues provided by nature for that purpose. 2. That many of our simple ideas are not images or resemblances of any thing inherent in the objects that produced them, as is usually thought. In order to comprehend this aright, we must distinguish between the primary and secondary qualities of bodies that produce these ideas. Primary qualities are such as are inseparable from the body in what state soever it be, and such

as our senses constantly find in every particle of matter, as solidity, extension, figure, &c. Secondary qualities are such as are, in reality, nothing in the objects themselves, but only powers to produce various sensations in us by means of their primary qualities, that is, by the figure, bulk, texture, &c. of their particles, as colours, sounds, taste, smell, &c.—Now the ideas of primary qualities are in some sense resemblances of them, and their patterns do really exist in the bodies themselves; but the ideas produced in us by those secondary qualities, have no resemblance of them at all; for there is nothing like our ideas existing in the bodies themselves that occasion them; and what we call blue, red, sweet, hot, &c. are in the bodies we denominate from them, no other than a power to produce these sensations in us.

Complex ideas, are those notions or conceptions of things that result from the various combinations and union of our simple ideas. These are of two principal kinds, namely, such as are derived from without, and represent those combinations of simple ideas, that have a real existence in nature, and are conceived to coexist in any particular subject without us; and such as are formed by the mind itself, arbitrarily uniting and putting together its ideas. Of the first kind are all our ideas of particular substances, as gold, silver, iron, a tree, a man, a horse, &c. in which the confused idea of substance, such as it is, is always the chief. And it is to be observed, that the mind in the reception of these, as well as of simple ideas, is wholly passive. Of the second kind of complex ideas are all those arbitrary collections of different ideas, which the mind by its own powers occasionally puts together, by compounding, comparing, diversifying and uniting its original notions, either for use in the commerce of life, or in its pursuit for further knowledge; such are our ideas of stated lengths, whether of duration or space, of numbers, and of many human actions; of which it is to be observed, that they are manifestly the creatures of the mind: for as in the perception of our other ideas, the mind was passive; in the formation of these, it is active.

This last class of our complex ideas, may again be subdivided, according to the different acts of the mind exerted in framing them, into compound

ideas, abstract ideas, and ideas of relations.

Compound idea, is an assemblage of many simple ideas united together by the mind, and considered by it as one picture or representation, and these may be considered as of two kinds. 1. Such as are only variations, or different combinations of the same simple idea without the mixture of any other, as a dozen, a score, which are no more than different assemblages of so many units, &c. 2. Such as are compounded of simple ideas of several sorts put together to make one complex one, as beauty, ingratitude, treason, &c. See *MODE*.

Abstract or general idea, the idea of some general quality, or property considered simply in itself, without any respect to a particular subject. Abstract ideas are formed by the mind by separating from any of its conceptions, all those circumstances that render it particular, or the representative of any simple determinate object: by which means, ideas taken from particular things become general, and in place of standing for individuals, are each made to denote or represent a whole class of things. Thus, for instance, upon seeing a triangle, or circle, the mind by leaving out the consideration of their particular dimension, and every thing else peculiar to them as they immediately affect the sight, and retaining only the notion of what is common to all triangles or circles, such as their figure or shape, formeth a general or abstract idea applicable to every triangle or circle. And the mind proceeding still further by excluding the consideration of their particular configuration, and whatever is peculiar to them, as figures of a particular form, and retaining only the notion of what is common to all geometrical figures, formeth an idea that is still more abstracted or general, applicable to every geometrical figure whatever.

In the same manner does the mind form the notion of whiteness in general, by leaving out the consideration of snow, milk, and every particular substance from which we have at any time received that idea. See the articles *ABSTRACT IDEA*, *ABSTRACTION* and *GENERAL TERMS*. Ideas of relations are a kind of complex ideas arising from the consideration or comparison of one idea with another, by examining their mutual respects, con-

nections,



nections, and correspondencies. It is thus that we acquire the ideas of greater and less, older and younger, father and son, superior and inferior, and innumerable others. See RELATION.

Ideas are also divided by logicians into adequate and inadequate, clear and obscure, real and fantastical.

Adequate ideas are such as perfectly represent those arch-types that the mind supposes them taken from, in all their parts and properties. The idea of a circle, which represents it as a round figure bounded by a curve line, whose parts are all equally distant from a point in the center, is an adequate idea thereof. Inadequate ideas are such as do but partially, or imperfectly, represent those arch-types to which they are referred. See the article ADEQUATE, &c.

Clear or distinct ideas are such as represent the objects to us so, as that when they occur to us again, we can not only readily know them, but easily distinguish them from all others; the contrary whereof is what are called obscure or confused ideas. For instance, the most illiterate, upon seeing the sun or moon, have so clear an idea of them, as easily to know and distinguish them again from any other planet or fixed star; but have not so distinct or clear an idea of jupiter, mars, or the other planets when once pointed out to them, as to know them again from one another, or from the fixed stars.

Real ideas are such as have a foundation in nature, or a conformity with the real being or existence of things.

Fantastical ideas are such as have no foundation in nature, or a conformity with the real being or existence of things, nor any arch-types to which they have a conformity.

**IDENTITATE NOMINIS**, in law, a writ that lies where a person is imprisoned instead of another of the same name, commanding the sheriff to enquire whether the prisoner be the person, against whom the action was brought, or not; and if not, to discharge him.

**IDENTITY**, SAMENESS, denotes that by which a thing is itself, and not any thing else; in which sense, identity differs from similitude as well as diversity. The idea of identity we owe to that power which the mind has of comparing the very being and existence of things, whereby considering any thing as existing at any certain time and place, and comparing it with itself as existing at any other time

and place, we accordingly pronounce it the same, or different. Thus when we see a man at any time and place, and compare him with himself when we see him again at any other time or place, we pronounce him to be the same we saw before. See the article SIMILITUDE and DIVERSITY.

To understand identity aright, we ought to consider the essence and existence, and the ideas these words stand for; it being one thing to be the same substance; another, the same man; and a third, the same person. For, suppose an atom existing at a determined time and place, it is the same with itself, and will continue so to be at any other instant as long as its existence continues; and the same may be said of two or any number of atoms, whilst they continue together; the mass will be the same; but if one atom be taken away, it is not the same mass. In animated beings it is otherwise, for the identity does not depend on the cohesion of its constituent particles, any how united in one mass; but on such a disposition and organization of parts, as is fit to receive and distribute life and nourishment to the whole frame. Man therefore, who hath such an organization of parts partaking of one common life, continues to be the same man, tho' that life be communicated to new succeeding particles of matter vitally united to the same organized body; and in this consists the identity of man, considered as an animal only. But personal identity, or the sameness of an intelligent being, consists in a continued consciousness of its being a thinking being, endowed with reason and reflection, capable of pain or pleasure, happiness or misery, that considers itself the same thing in different times and places. By this consciousness every one is to himself, what he calls *self*, without considering, whether that *self* be continued in the same or divers substances; and so far as this consciousness extends backward to any past action, or thought, so far extends the identity of that person, and makes it the object of reward and punishment. Hence it follows, that if the consciousness went with the hand, or any other limb when sever'd from the body, it would be the same self that was just before concerned for the whole. And if it were possible for the same man to have a distinct incommunicable consciousness at different times, he would without doubt at different times make different

ferent persons ; which we see is the sense of mankind as to madmen, for human laws do not punish the madman for the sober man's actions, nor the sober man for what the madman did, thereby considering them as two persons.

**IDEOT, or IDIOT.** See **IDIOR.**

**IDES, idus,** in the antient roman calendar, were eight days in each month ; the first of which fell on the 15th of March, May, July, and October ; and on the 13th day of the other months.

They were reckoned backwards, in the manner already explained under the article **CALENDS.**

Thus they called the 14th day of March, May, July and October ; and the 12th of the other months, the *pridie idus*, or the day before the ides ; the next preceding day, they called the *tertio idus* ; and so on, reckoning always backwards, till they came to the nones. See **NONES.** This method of reckoning time is still retained in the chancery of Rome, and in the calendar of the breviary.

**IDIOM, ἰδιωμα,** among grammarians, properly signifies the peculiar genius of each language, but is often used in a synonymous sense with dialect. See the articles **LANGUAGE** and **DIALECT.**

**IDIOPATHY,** in physic, a disorder peculiar to a certain part of the body, and not arising from any preceding disease ; in which sense, it is opposed to sympathetic. Thus, an epilepsy is idiopathic, when it happens merely thro' some fault in the brain ; and sympathetic, when it is the consequence of some other disorder.

**IDIOSYNCRASY,** among physicians, denotes a peculiar temperament of body, whereby it is rendered more liable to certain disorders, than persons of a different constitution usually are. See the article **TEMPERAMENT.**

**IDIOT, or IDEOT,** a person that is born a natural fool.

Such a person is not to be prosecuted for any crime, as not having knowledge to distinguish good from evil ; yet it is said, that if a man has so much knowledge as to measure a yard of cloth, tell or number twenty-pence in small money, or regularly to name the days of the week, or to beget a child, he shall not, by our laws, be accounted an ideot.

The king has a right to the custody of an ideot's lands, and to receive the profits of the same during his life, without committing waste ; and finding him and his family, if he have any, necessaries.

**IDOLATRY, εἰδωλολατρεία,** a word of greek original, compounded of εἰδωλον an image, and λατρεύειν, to worship or serve. Idolatry, or the worship of idols, may be distinguished into two sorts. By the first, men adore the works of Gods, the sun, the moon, the stars, angels, dæmons, men and animals : by the second, men worship the work of their own hands, as statues, pictures, and the like : and to these may be added a third, that by which men have worshipped the true God under sensible figures and representations. This indeed may have been the case with respect to each of the above kinds of idolatry ; and thus the Israelites adored God under the figure of a calf.

Some authors make idolatry to be more antient than the deluge, and believe that it began in the time of Enos ; for which they cite the last verse of the fourth chapter of Genesis, where, according to our version, it is said, " Then began men to call upon the name of the Lord ; " but which these authors render, " Then began men to profane the name of the Lord ; " that is, to corrupt the worship of God by idolatry. " At this time, says Maimonides, men began to study the motions of the heavenly bodies, and from thence were led to think, that they were the ministers of God in the government of the world. This induced them to praise, honour and adore the stars, as his officers or substitutes, and upon this foundation, they erected temples, and offered sacrifices to the heavenly bodies."

Others are of opinion, that idolatry did not begin till after the deluge, and that it had its rise in Babylon ; where divine honours were first paid to Jupiter Belus. If this be the truth of the case, it may not be improbable that the idolatry and polytheism which prevailed after the deluge, might spring from the impiety and atheism before the deluge : for it being natural for men to pass from one extreme to another, those who lived immediately after the deluge, and had been, as it were, witnesses of the punishment inflicted on atheism, and impiety, might by ignorance be led to superstition ; and for fear of relapsing into atheism, which had destroyed the world, might set up the worship of an infinite number of gods. This is not to be understood of Noah himself, or his sons, who must be supposed to have had the knowledge of the

the true god ; but of their descendants, upon the division of tongues and dispersion of the people.

However this be, it seems clear, that the stars were the first objects of idolatrous worship ; and that on account of their beauty, their influence on the productions of the earth, and the regularity of their motions, particularly the sun and moon, which were considered as the most glorious and resplendent images of the deity : afterwards, as their sentiments became more corrupted, they began to form images, and to entertain the opinion, that by virtue of consecration, the gods were called down, to inhabit or dwell in their statues. Hence Arnobius takes occasion to rally the pagans for guarding so carefully the statues of their gods, who, if they were really present in their images, might save their worshippers the trouble of securing them from thieves and robbers. For the pagan gods; see the article GODS.

As to the adoration which the antient pagans paid to the statues of their gods ; it is certain, that the wiser and more sensible heathens considered them only as simple representations or figures designed to recal to their minds the memory of their gods. This was the opinion of Varro and Seneca : and the same sentiment is clearly laid down in Plato, who maintains, that images are inanimate, and that all the honour paid to them has respect to the gods whom they represent. But as to the vulgar, they were stupid enough to believe the statues themselves to be gods, and to pay divine worship to flocks and stones.

Soon after the flood, idolatry seems to have been the prevailing religion of all the world; for wherever we cast our eyes at the time of Abraham, we scarcely see any thing but false worship and idolatry. And it appears from scripture, that Abraham's forefathers, and even Abraham himself, were for a time idolaters.

The Hebrews were indeed expressly forbidden to make any representation of God ; they were not so much as to look upon an idol : and from the time of the Maccabees to the destruction of Jerusalem, the Jews extended this precept to the making the figure of any man : by the law of Moses, they were obliged to destroy all the images they found, and were forbidden to apply any of the gold or silver to their own use, that no one might receive the least profit from any

thing belonging to an idol. Of this the Jews, after they had smarted for their idolatry, were so sensible, that they thought it unlawful to use any vessel that had been employed in sacrificing to a false god ; to warm themselves with the wood of a grove, after it was cut down ; or to shelter themselves under its shade.

But the preaching of the christian religion, wherever it prevailed, entirely rooted out idolatry, as did also that of Mahomet, which is built on the worship of one God. It must not, however, be forgotten, that the protestant christians charge those of the church of Rome with paying an idolatrous kind of worship to the pictures or images of saints and martyrs : before these, they burn lamps and wax-candles ; before these, they burn incense, and kneeling offer up their vows and petitions : they, like the pagans, believe that the saint to whom the image is dedicated, presides in a particular manner about its shrine, and works miracles by the intervention of its image ; and that if the image was destroyed or taken away, the saint would no longer perform any miracle in that place.

IDYLLION, *εἰδύλλιον*, in antient poetry, is only a diminutive of the word *εἶδος*, and properly signifies any poem of moderate extent, without considering the subject.

But as the collection of Theocritus's poems, were called idyllia, and the pastoral pieces being by far the best in that collection, the term idyllion seems to be now appropriated to pastoral pieces. See the article PASTORAL POETRY.

So very different are our modern idyllions from those of the antients, by introducing none but allegorical shepherds, that a literal translation of Theocritus's idyllions, however well executed, would be relished only by people of taste, and those too well acquainted with the simplicity and manners of the antients.

JEALOUSY, in general, denotes the fear of a rival ; but is more especially understood of the suspicion, which married people entertain of each others fidelity and affection.

*Bitter-waters of JEALOUSY*, in jewish antiquity, certain consecrated waters, which a woman was obliged to drink, in order to clear herself of the crime of adultery, whereof her jealous husband accused her ; the consequence of which draught was, that if innocent she suffered no harm, but if guilty her belly swelled, &c.

**JEAN DE ANGELI**, a town of Guienne, in France, thirty-five miles south-east of Rochelle.

**JEAN DE LUZ**, a port of France, in the province of Gascony, situated near the frontiers of Spain: west long.  $1^{\circ} 32'$ , north lat.  $43^{\circ} 30'$ .

**JEAN DE MAURIENNE**, a city in the dutchy of Savoy, thirty miles south-east of Chamberry: east long.  $6^{\circ} 8'$ , north lat.  $45^{\circ} 16'$ .

**JEAN PIED DE PORT**, a town of the province of Navarre, in France, situated on the river Nive, on the frontiers of Spain: west long.  $1^{\circ} 25'$  north lat.  $43^{\circ} 16'$ .

**JECORINUS**, in ichthyology, a fish, otherwise called hepatus. See **HEPATUS**.

**JECUR**, the **LIVER**, in anatomy. See the article **LIVER**.

**JECUR MARINUM**, or **JECORINUS**. See **JECORINUS**.

**JECUR UTERINUM**, in anatomy, a name by which some call the placenta. See the article **PLACENTA**.

**JEDBURGH**, the capital of Tiviotdale or Roxburgh, in Scotland, thirty-six miles south-east of Edinburgh: west long.  $2^{\circ} 15'$ , north lat.  $55^{\circ} 25'$ .

**JEDDO**, the capital city of Japan Proper, situated on the east side of the island: east long.  $141^{\circ}$  north lat.  $36^{\circ}$ .

The splendor of the royal palace and public buildings of this city, in the opinion of those Europeans who have seen it, is no where to be equalled. The emperor's palace and gardens, which are in the middle of the city, are five miles in circumference. All the houses are built upon one floor, and the rooms are only divided by folding screens.

**JEER**, or **JEER-ROPE**, in a ship, is a large rope reeved thro' double or treble blocks, lashed at the mast head, and on the yard, in order to hoist or lower the yards.

**JEERS**, or, being brought to the jeers, in the sea-language, signifies, a person's being punished at the jeer-captain, by having his arms extended cross-wise, and tied to the captain-bar when thrust thro' the barrel, and standing thus, with a heavy weight about his neck. In this posture he is obliged to continue till he is either brought to confess some crime of which he is accused, or has suffered the punishment which the captain has sentenced him to undergo.

**JEHOVAH**, one of the scripture names of God, signifying the Being who is self-existent, and gives existence to others. See the article **GOD**.

So great a veneration had the Jews for this name, that they left off the custom of pronouncing it, whereby its true pronunciation was forgotten. They call it tetragrammaton, or the name with four letters; and believe, that whoever knows the true pronunciation of it cannot fail to be heard by God.

**JEJUNUM**, in anatomy, the second of the small guts, so called because it is usually found empty. This is owing to the fluidity of the chyle, the greater stimulus of the bile in it, and the abundance of the lacteal vessels with which it is furnished. Its situation is in the region above the navel; it has a great many connivent glands. Its beginning is where the duodenum ends; and it terminates, where these valves are obliterated: Its length is different in various subjects; but is usually between thirteen and sixteen spans. See **INTESTINES**.

**JEKYL**, a small island in the mouth of the river Alatamaha, in Georgia, fortified by Mr. Oglethorpe.

**JEMPTERLAND**, *Jemptia*, a province of Sweden, bounded by Angermania on the north; by Medelpadia on the east, by Helplingia on the south, and by Norway on the west.

**JENA**, a city of Germany, in the circle of Upper Saxony, and the Landgraviate of Thuringia: east long.  $11^{\circ} 44'$ , north lat.  $51^{\circ}$ .

**JENDE**, a great lake, in the province of Finland, in Sweden.

**JENISA**, a large river of Russia, that runs from south to north thro' Siberia, and falls into the frozen ocean in  $72^{\circ}$  of east longitude, and  $70^{\circ}$  of north lat.

**JENKOPING**, a city of Sweden, in the province of Gothland, situated ninety miles south east of Gottenburg: east long.  $14^{\circ} 30'$ , north  $57^{\circ} 30'$ .

**JENNET**, or **GENET**, in the manege. See the article **GENET**.

**JENNY-WREN**, a name sometimes given to the wren. See the article **WREN**.

**JENO**, or **GENO**, a town of upper Hungary, twenty miles south of Great Waradin, and subject to the house of Austria.

**JENTLING**, in ichthyology, the blue chub, a fish caught in the Danube, and larger than the common chub. See the article **CHUB**.

**JEOPFAILE**, or **JEOPFAYLE**, in law, a term used for an oversight in pleading, or other proceedings at law.

The shewing of these defects or oversights, was formerly often practised by the

the counsel; and when the jury came into court, in order to try the issue, they said, this inquest you ought not to take; and after verdict they would say to the court, to judgment you ought not to go: but several statutes have been made to avoid the delays occasioned by such suggestions; and a judgment is not to be stayed after verdict for mistaking the christian or surname of either of the parties, or in a sum of money, or in the day, month, year, &c. where the same are rightly named in any preceding record.

**JERSEY**, an island in the english channel, fifteen miles west of the coast of Normandy, and eighty miles south of Portland in Dorsetshire: west long.  $2^{\circ} 20'$ , north lat.  $49^{\circ} 20'$ .

It is about 30 miles in circumference, and contains twelve parishes, the chief town is St. Hillary. Though the island is subject to England, the inhabitants are still governed by norman laws, and the courts of England have no jurisdiction there.

**New JERSEY**, a province in North America, which may be bounded on the north by a line drawn from the river Delaware to Hudson's river, which divides it from New-York; by the Atlantic Ocean, on the east; by the same ocean on the south, and by Delaware bay and river, which separates it from Pensilvania, on the west. It lies between  $74^{\circ}$  and  $76^{\circ}$  of west long. and between  $39^{\circ}$  and  $41^{\circ}$  of north lat. and is about 140 miles in length, and 60 in breadth. It is subject to England. The chief towns are Burlington, Perth-Amboy, and Elizabeth Town. It produces corn, black-cattle, furs, and pipe-staves.

**JERUSALEM**, the capital city of Judea, or Palestine, in Asiatic Turkey, situated thirty miles east of the Levant, or Mediterranean Sea, and ninety miles south of Damascus: east long.  $36^{\circ}$ , north lat.  $32^{\circ}$ .

It stands on a high rock, with steep ascents on every side, except on the north, and is surrounded with a deep valley, which is again incompassd with hills. The city is at present three miles in circumference, and has a little altered its situation; for Mount Calvary, which was formerly without the walls, stands now in the middle of the city, and Mount Sion, which stood near the center, is now without the walls.

**JESI**, a city of Italy, in the province of Ancona, and territory of the pope: east long.  $14^{\circ} 40'$ , north lat.  $43^{\circ} 45'$ .

**JESSE**, a branched candlestick, or sconce; an useful ornament, first introduced into our churches about the year 1100.

**JESSELMERE**, the capital of the province of the same name in the East-Indies, subject to the Mogul: east long.  $73^{\circ} 20'$ , north lat.  $27^{\circ}$ .

**JESSO**, or **YEDSO**, a country of Asia, which lies north of Japan, and is said to extend north-east to the continent of America: east long.  $140^{\circ}$ , north lat.  $40^{\circ}$ .

**JESUAT**, a province of India, bounded by Patan on the north, and by Bengal on the south; subject to the mogul.

**JESUITES**, or the society of Jesus, a most famous religious order in the romish church, founded by Ignatius Loyola, a native of Guipuscoa in Spain, who in the year 1538, assembled ten of his companions at Rome, principally chosen out of the university of Paris, and made a proposal to them to form a new order; when, after many deliberations, it was agreed to add to the three ordinary vows of chastity, poverty, and obedience, a fourth; which was, to go into all countries whither the pope should please to send them, in order to make converts to the romish church. Two years after, pope Paul III. gave them a bull, by which he approved this new order, giving them a power to make such statutes as they should judge convenient: on which, Ignatius was created general of the order; which in a short time spread over all the countries of the world, to which Ignatius sent his companions, while he staid at Rome, from whence he governed the whole society.

The entire society is composed of four sorts of members; novices, scholars, spiritual and temporal coadjutors, and professed members. The novices continue so two years, after which they are admitted to make the three simple vows, of chastity, poverty and obedience, in the presence of their superiors: the scholars add some spiritual exercises to their studies. The spiritual coadjutors assist the professed members, and also make the three simple vows: the temporal coadjutors, or lay-brothers, take care of the temporal affairs of the society; and the professed members, which compose the body of the society, besides the three simple vows, add a special vow of obedience to the head of the church in every thing relating to missions among idolaters and heretics. They have professed houses for their professed members

and their coadjutors ; colleges, in which the sciences are taught to strangers ; and seminaries, in which the young jesuits go thro' a course of philosophy and theology. They are governed by a general, who has four assistants, and who appoints rectors, superiors of houses, provincials, visitors, and commissaries. The discipline of these houses, and especially of the colleges, was regulated by Ignatius himself.

**JET**, *gagates*, in natural history, a solid, dry, opaque, inflammable substance, found in large detached masses, of a fine and regular structure, having a grain like that of wood, splitting more easily horizontally than in any other direction, very light, moderately hard, not fusible, but readily inflammable, and burning a long time with a fine greenish flame.

It is of a fine deep black colour, very glossy and shining, except upon its surface, where it has been fouled by accident. When examined by the microscope, it is found to be composed of a number of parallel plates, very thin, and laid closely upon one another. It is not soluble in, nor makes any effervescence with acids. It should be chosen of the deepest black, of a moderate hardness, very light, and such as will split most evenly in an horizontal direction ; this being its great characteristic, by which it is distinguished from the cannel-coal, which breaks equally easy any way.

Jet is of great use to perfumers, and is sometimes prescribed in medicine. Dioscorides tells us, that it is an excellent emollient and discutient, and recommends a fumigation of it for diseases of the womb ; and among the eastern nations, it is still in high repute as a cordial, a strengthener, and prolonger of life.

Every pound of jet pays on importation a duty of 7<sup>7</sup>/<sub>10</sub>d. and draws back 6<sup>7</sup>/<sub>10</sub>d. on exportation.

**JET D'EAU**, a french term, frequently also used with us, for a fountain that casts up water to a considerable height in the air. See **FOUNTAIN**.

**JETSON**, **JETSEN**, or **JETSAM**, in law, is used for any thing thrown out of a ship or vessel that is in danger of being a wreck, and which is driven by the waves on shore. See **FLOTSON**.

**JEVER**, a town of Germany, in the circle of Westphalia, sixteen miles north-east of Embden : east long. 7° 5', north lat. 53° 30'.

**JEWEL**, any precious stone, or ornament beset with them. See the articles **DIAMOND**, **RUBY**, &c.

**JEWEL-OFFICE**, an office belonging to the crown, that has the charge of fashioning and weighing the king's plate, and delivering it out by warrants from the lord chamberlain.

The principal officer is the master of the jewel-office, who has a salary of 450l. per annum.

**JEWS**, those who profess obedience to the laws and religion of Moses, before whom every man worshipped God according to the inclination of his own heart.

How far the religious ceremonies of the Jews were copied from those of the Egyptians, among whom they had so long sojourned, or how far they were typical of something future, are questions which we leave to be discussed by divines. But as to the religion of the modern Jews, it is a manifest absurdity ; since being without a temple, sacrifices, &c. it cannot be considered as subsisting any longer.

Be this as it will, we shall subjoin a few of their miscellaneous customs, as related by Leo of Modena, an author of their own.

When a Jew builds an house, he must leave part of it unfurnished, in remembrance that the temple and Jerusalem now lie desolate. They lay great stress upon frequent washings. They abstain from meats prohibited by the levitical law ; for which reason, whatever they eat must be dressed by Jews, and after a manner peculiar to themselves. Every Jew is obliged to marry, and a man who lives to twenty unmarried, is accounted as actually living in sin.

The Jews, it is said, were formerly at the disposal of the chief lord where they lived, and likewise all their goods. A Jew may be a witness by our law, being sworn on the Old Testament, and taking the oaths to the government.

For a farther account of the Jews, see the articles **CARAITES**, **CIRCUMCISION**, **LEVITES**, **PASSOVER**, **PHARISEES**, **RABBINS**, **SADDUCEES**, **SANHEDRIM**, **SYNAGOGUE**, **TALMUD**, &c.

**JEW'S EARS**, *auricula judæ*, in botany. See **AURICULA**.

This fungus is seldom found unless on the lower parts of the trunks of elder-trees ; whence it is called sambucus. It is not much used by physicians ; but

is in great repute among the common people, who cure themselves of sore throats with a decoction of its milk. This, tho' by no means a pleasant medicine, is however a very efficacious one.

**JEW'S STONE**, *lapis judaicus*, in the materia medica, an extraneous fossil, being nothing but the petrified spine of a large echinus marinus. It is of the figure of an olive, and is furrowed and ridged alternately in a longitudinal direction. It is solid, considerably heavy, and difficult to break; being, indeed, a petrefaction solely composed of spar, and that tolerably pure. Hence, it is said to be a great diuretic and lithontriptic; and that it possesses the former of these virtues is very certain, but it is not equally sure that it has any thing of the other. It acts in this case as mere spar, all the spar in the world, whether in its solid form, or in a natural state of solution in water, being diuretic. The lapis judaicus is given in an impalpable powder, and the dose is from one scruple to a dram.

**JEWISH HOURS**, in chronology. See the article **HOURL**.

**JEZIDES**, among the mahometans, a term of similar import with heretics among christians.

The jezides are a numerous sect inhabiting Turkey and Persia, so called from their head Jezid, an arabian prince, who slew the sons of Ali, Mahomet's father-in-law, for which reason he is reckoned a parricide, and his followers heretics. There are about 200,000 jezides in Turkey and Persia; who are of two sorts, black and white. The white are clad like Turks, and distinguished only by their shirts, which are not slit at the neck like those of others, but have only a round hole to thrust their heads thro'. This is in memory of a golden ring, or circle of light, which descended from heaven upon the neck of their cheq, the head of their religion, after his undergoing a fast of forty days. The black jezides, tho' married, are the monks or religious of the order; and these are called Fakirs.

The Turks exact excessive taxes from the Jezides, who hate the Turks as their mortal enemies, and when, in their wrath, they curse any creature, they call it mussulman: but they are great lovers of the christians, being more fond of Jesus Christ than of Mahomet, and are never circumcised but when forced it.

They are extremely ignorant, and believe both the bible and the koran without reading either of them; they make vows and pilgrimages, but have no places of religious worship.

All the adoration they pay to God consists of some songs in honour of Jesus Christ, the Virgin, Moses, and sometimes Mahomet; and it is a principal point of their religion never to speak ill of the devil, lest he should resent the injury, if ever he should come to be in favour with God again, which they think possible: whenever they speak of him, they call him the Angel Peacock. They bury their dead in the first place they come at, rejoicing as at a festival, and celebrating the entry of the deceased into heaven. They go in companies like the Arabians, and change their habitations every fifteen days. When they get wine, they drink it to excess, and it is said, that they sometimes do this with a religious purpose, calling it the blood of Christ. They buy their wives, and the market-price is two hundred crowns for all women, handsome or not, without distinction.

**IGLAW**, a town of Germany, in the province of Moravia, situated on the river Igl, on the frontiers of Bohemia; subject to the house of Austria: east long. 15° 7', north lat. 49° 16'.

**IGNATIUS'S BEAN**, *faba St. Ignatii*, in the materia medica. See **FABA**.

**IGNAVUS**, in zoology, an animal called in english the sloath, and by authors bradypus. See **BRADYPUS** and **SLOATH**.

**IGNIS**, FIRE, in physiology, chemistry, &c. See the article **FIRE**.

**IGNIS-AQUA**, Helmont's name for the alkalest. See **ALKAHEST**.

**IGNIS-FATUUS**, in meteorology, a meteor otherwise called, will-with-a-wisp. See the article **WILL-with-a-wisp**.

**IGNIS GEHENNÆ**, the same with the universal dissolvent, or alkalest. See the article **ALKAHEST**.

**IGNIS JUDICII**, in our old customs, a purification by fire. See **ORDEAL**.

**IGNISPICIUM**, in antiquity, a species of pyromancy, wherein predictions were drawn from the fire used in sacrifices. See **PYROMANCY** and **DIVINATION**.

**IGNITION**, in chemistry, the heating metals red-hot, without melting them. Lead and tin are too soft, to bear ignition; which takes effect only in the harder metals, as gold and silver, but especially iron.

**IGNORAMUS**, in law, a term which signifies we are ignorant. This is used when the grand jury impanelled on the inquisition of criminal causes, reject the evidence as too weak to make good the presentment or indictment brought against a person, so as to bring him upon his trial by a petty jury; in which case, they indorse this word on the back of the bill of indictment. In consequence of which, all further proceedings against the party accused are stopped, and the supposed offender is delivered without further answer.

**IGNORANCE**, *ignorantia*, the privation or absence of knowledge. See the article **KNOWLEDGE**.

The causes of ignorance, according to Locke, are chiefly these three. 1. Want of ideas. 2. Want of a discoverable connection between the ideas we have. 3. Want of tracing and examining our ideas. See the article **IDEA**.

As to the first of these causes, he observes, that all the simple ideas we have, are confined to the observation of our senses, and the operations of our own mind, which we are conscious of in ourselves. What other ideas it is possible other creatures may have, by the assistance of other senses and faculties, more or perfecter than we have, or different from ours, it is not for us to determine; but to say or think there are no such, because we conceive nothing of them, is no better an argument than if a blind man should be positive, that there was no such thing as sight and colours, because he had no manner of idea of any such thing. What faculties, therefore, other species of creatures have to penetrate into the nature and inmost constitutions of things, we know not. This we know, and certainly find, that we want other views of them besides those we have, to make discoveries of them more perfect. The intellectual and sensible world are in this perfectly alike, that the parts which we see of either of them, hold no proportion with that we do not see; and whatsoever we can reach with our eyes, or our thoughts, of either of them, is but a point, and almost nothing in comparison of the rest.

Another great cause of ignorance, is the want of those ideas we are capable of. This keeps us in ignorance of things which we conceive capable of being known. We have ideas of bulk, figure, and motion; yet not knowing what is

the particular bulk, motion, and figure of the greatest part of the bodies of the universe, we are ignorant of the several powers, efficacies, and ways of operation, by which the effects we daily see are produced. These are hid from us, in some things, by being too remote; in others, by being too minute.

When we consider the vast distance of the known and visible parts of the world, and the reason we have to think, that what lies within our ken, is but a small part of the immense universe, we shall then discover an huge abyss of ignorance. What are the particular fabrics of the great masses of matter which make up the whole stupendous frame of corporeal beings, how far they are extended, and what is their motion, and how continued, and what influence they have upon one another, are contemplations in which at the first glimpse our thoughts are lost. If we confine our thoughts to this little canton, I mean this system of our sun, and the grosser masses of matter that visibly move about it; what several sorts of vegetables, animals, and intellectual corporeal beings, infinitely different from those of our little spot of the earth, may probably be in other planets, to the knowledge of which, even of their outward figures and parts, we can no way attain while we are confined to this earth, there being no natural means, either by sensation or reflection, to convey their certain ideas into our minds?

There are other bodies in the universe no less concealed from us by their minuteness. These insensible corpuscles being the active parts of matter, and the great instruments of nature, on which depend all their secondary qualities and operations, our want of precise distinct ideas of their primary qualities, keeps us in incurable ignorance of what we desire to know about them. Did we know the mechanical affections of rhubarb or opium, we might as easily account for their operations of purging and causing sleep, as a watchmaker can for the motions of his watch. The dissolving of silver in aqua fortis, or gold in aqua regia, and not *vice versa*, would be then perhaps no more difficult to know, than it is to a smith to understand why the turning of one key will open a lock, and not the turning of another. But while we are destitute of senses, acute enough to discover the minute particles of bodies, and to give us ideas of their mecha-



mechanical affections, we must be content to be ignorant of their properties and operations; nor can we be assured about them any farther, than some few trials we make, are able to reach: but whether they will succeed again another time, we cannot be certain. This hinders our certain knowledge of universal truths concerning natural bodies: and herein our reason carries us very little beyond particular matters of fact. And therefore I am apt to doubt, that how far soever human industry may advance useful and experimental philosophy in physical things, yet the scientific will still be out of our reach; because we want perfect and adequate ideas of those very bodies which are nearest to us, and most under our command.

This, at first sight, shews us how disproportionate our knowledge is to the whole extent even of material beings: to which if we add the consideration of that infinite number of spirits that may be, and probably are, which are yet more remote from our knowledge, of which we have no cognizance, we shall find this cause of ignorance, conceal in an impenetrable obscurity, almost the whole intellectual world; a greater certainly, and a more beautiful world than the material. For bating some very few ideas of spirit, which we get from our own minds by reflection, and from thence the best we can collect of the father of all spirits, the author of them and us, and all things, we have no certain information, so much as of the existence of other spirits, but by revelation; much less have we distinct ideas of their different natures, states, powers, and several constitutions, in which they either agree or differ one from another, and from us. And therefore in what concerns their different species and properties, we are under an absolute ignorance.

The second cause of ignorance is the want of a discoverable connection between those ideas we have: where we want that, we are utterly incapable of universal and certain knowledge; and are, as in the former case, left only to observation and experiment. Thus the mechanical affections of bodies, having no affinity at all with the ideas they produce in us, we can have no distinct knowledge of such operations beyond our experience; and can reason no otherwise about them, than as the effects or appointment of an infinitely wise agent,

which perfectly surpasses our comprehensions.

The operation of our minds upon our bodies is as inconceivable. How any thought should produce a motion in body, is as remote from the nature of our ideas, as how any body should produce any thought in the mind. If experience did not convince us that it is so, the consideration of the things themselves would never be able, in the least, to discover it to us.

In some of our ideas there are certain relations, habitudes and connections so visibly included in the nature of the ideas themselves, that we cannot conceive them separable from them by any power whatsoever: in these only, we are capable of certain and universal knowledge. Thus the idea of a right-lined triangle, necessarily carries with it an equality of its angles to two right ones. But the coherence and continuity of the parts of matter, the production of sensation in us, of colours and sounds, &c. by impulse and motion, being such in which we can discover no natural connection with any ideas we have, we cannot but ascribe them to the arbitrary will and good pleasure of the wise architect.

The things which we observe always proceed regularly, we may conclude, act by a law that is set them, but yet by a law that we know not; by which, tho' causes work steadily, and effects constantly flow from them, yet their connections and dependencies not being discoverable in our ideas, we can only have an experimental knowledge of them. Several effects come every day within the notice of our senses, of which we have so far sensible knowledge; but of the causes, manner, and certainty of their production, we must for the foregoing reasons be content to be ignorant. In these we can go no farther than particular experience informs us of matter of fact, and by analogy, guess what effects the like bodies are, upon other trials, like to produce.

The third cause of ignorance is our want of tracing those ideas we have, or may have, and finding out those intermediate ideas which may shew us what habitude of agreement or disagreement they may have one with another. Thus many are ignorant of mathematical truths, for want of application in enquiring, examining, and by due ways comparing those ideas.

IGNORANCE,

**IGNORANCE**, in law, is a want of knowledge of the laws, which will not excuse a person from suffering the penalty inflicted on the breach of them: for every one is obliged, at his peril, to know the laws of the land. An infant who is just arrived at the age of discretion, and who may therefore be supposed to be ignorant of the law, is punishable for crimes; but at the same time infants of tender age, who are naturally ignorant, are excused. This is also the case with respect to persons who are non compos mentis. See **INFANT**, **LUNATIC**, &c.

**IGUANA**, in zoology, an american species of lizard, with a long round tail, five toes on each foot, and the crest of the throat and the dorsal suture dentated. See the article **LIZARD**.

**IHOR**, the capital of the province of Ihor, in Malacca, near the south cape of the further peninsula of India, subject to the Dutch: east long.  $103^{\circ}$ , north lat.  $3^{\circ}$ .

**JIG**, or **GIGG**, in music. See **GIGG**.

**ILCHESTER**, a borough-town of Somersetshire, fourteen miles south of Wells. It sends two members to parliament.

**ILDEFONSO**, a palace belonging to the king of Spain.

**ILEX**, the **HOLM-OAK**, or **EVER-GREEN-OAK**, in botany, a genus of the *tetrandria-tetragynia* class of plants, the flower of which consists of one plain petal, divided into four roundish, hollow, and open segments, cohering only at their bottoms: the fruit is a roundish berry, with four cells, each of which contains a single hard, oblong, and obtuse seed, gibbous on one side, and angular on the other.

The wood of these trees is accounted very good for many sorts of tools and utensils, as mallet-heads, mallet-balls, chairs, wedges, beetles, pins, &c. as also for palisadoes. It likewise affords the most durable charcoal in the world.

The kermes, or species known by the name of the holm-oak, is of a much lower stature than the other species of ever-green oaks; seldom growing to the height of a tree. See **KERMES**.

**ILHEOS**, or **RIO DE ILHEOS**, a province of Brazil in south America, subject to Portugal. It is bounded by the bay of All-saints on the north, and by the Atlantic ocean on the east.

**ILIAC PASSION**, in medicine, a pain in the small intestines, apt to turn to an inflammation, in which their peristaltic motion is inverted, and their contents, and even the excrements themselves, are

voided by the mouth in vomiting. Nothing will pass down, not so much as a flatus. It is often attended with fatal symptoms.

This disease, according to Hoffman, is preceded with costiveness, which is soon followed with most sharp and violent pains, with an inflation, distension, and a tumour of the umbilical region, which feels hard to the touch; the body is so hard bound, that neither wind nor excrements can pass downwards: soon after the wind first makes its way upward, there comes on a nausea, and a frequent vomiting of a bilious and pituitous matter; the breathing grows difficult, and whatever is eaten or drank is soon thrown up again; reddish fæces, with a stinking smell, are afterward forced up by vomiting: this is succeeded by loss of strength, a preternatural heat, a hard and contracted pulse, with great thirst: the urine is red, and is voided with difficulty. When the case becomes desperate, a hiccoughing and delirium appear; the nerves are distended, the body is all in a cold sweat, and violent convulsions and fainting fits put an end to the patient.

This disease may proceed from a rupture, either of the scrotum or the groin; from poisons, from any thing that stops up the passage thro' the small guts, such as hard, dry food, chestnuts, sea-biscuits, quinces, pears, unripe acerb fruit, when eaten in large quantities; to which drinking little, a sedentary life, and a melancholy disposition of mind, will greatly contribute: these all tend to harden the fæces; the gross intestines may also be plugged up with scybals, especially if a person, either through shame, or want of convenience, does not listen to the calls of nature.

As to the cure, Sydenham thinks it necessary first of all to bleed in the arm, and afterwards, in an hour or two, exhibit a powerful clyster; the smoke of tobacco blown into the bowels through an inverted pipe, he recommends as the most efficacious remedy: this may be repeated some time after, unless the effect of the first renders it unnecessary. If the disease will not yield to this, a pretty strong cathartic is advisable: thus, take of the pill of simple colocynth, half a dram; of calomel, one scruple; and as much as is sufficient of the balsam of peru. Make the whole into four pills to be taken out of a spoonful of syrup of violets, taking no liquor upon them less they

they cannot be retained : or, take resin of scammony, or instead of it, resin of jalap, twelve grains ; calomel, one scruple ; reduce them into powder, taking this out of a spoonful of cow's milk : take one or two spoonfuls of the same milk after swallowing them. If the patient cannot retain this, let him take twenty-five drops of the thebaic tincture in half an ounce of spirituous cinnamon-water ; and when the vomiting and pain remit, let the cathartic be repeated ; and if the pain returns, give the anodyne again, and repeat it every fourth or sixth hour till the intestines are easy, and the cathartic begins to pass downwards. When it has done working, give the following draught : take of spirituous water of cinnamon, two ounces ; of thebaic tincture, twenty-five drops ; of which make a draught, which is to be repeated twice or thrice a day, till the vomiting and pains quite cease : afterwards it will be advisable to give a paregoric, at bedtime, for several nights.

Hoffman advises, after the pains are mitigated by anodynes, that a cataplasin should be applied to the hypogastric region, to stop the vomiting and hiccupping, which may be composed of equal parts of old venice-treacle, and expressed oil of nutmegs, with the addition of oil of mint and camphire. This done, a gentle laxative of manna, cream of tartar, and oil of sweet almonds may be given with a more happy success, if the excrements have been long retained. When there is an inflammation, nothing is better than six or eight grains of purified nitre, and half a grain of camphire mixed with some antispasmodic powder, and then taken in a convenient vehicle. Outwardly apply a liniment of axungia-humana, or any other penetrating fat, and a dram of camphire.

But when other things fail in the cure of the iliac passion, recourse must be had to quicksilver ; half a pound or a pound at most is sufficient, with fat broth or oil ; and the patient should lie on his right side, or walk gently about the room, that its descent may be easier ; but if there is an actual inflammation, the quicksilver should not be used. Opiates may be used to mitigate the pain, provided they are exhibited in the beginning after bleeding, or before there is any signs of a mortification. Clysters are generally very advantageous, for they relax the spasm of the gross intestines,

and for this purpose warm water with spirit of marshmallows will be sufficient : they should be given very soon after the first attack. When the iliac passion proceeds from an incarcerated hernia, then Heister recommends bleeding as of the greatest advantage. See HERNIA.

**ILIACUS MUSCULUS**, in anatomy, a broad, thick muscle, lying on the inside of the os ilium. It is fixed by fleshy fibres to the internal labium of the crest of the os ilium, to that of the slope between the two anterior spines, to the insides of these spines, to the superior half of the inside of this bone, and to the adjacent lateral part of the os sacrum. All these fibres, contracting by degrees, run obliquely towards the lower part of the musculus psoas, uniting with it ; and being fixed by a kind of aponeurosis to the outside of its tendon, all the way to the little trochanter.

**ILIAD**, *Ἰλιάς*, in literary history, the name of an antient epic poem, the first and finest of those composed by Homer.

The poet's design in the *iliad* was to shew the Greeks, who were divided into several little states, how much it was their interest to preserve a harmony and good understanding among themselves : for which end, he sets before them the calamities that befel their ancestors from the wrath of Achilles, and his misunderstanding with Agamemnon ; and the advantages that afterwards accrued to them from their union. The *iliad* is divided into twenty-four books, or rhapsodies, which are marked with the letters of the alphabet.

The critics maintain the *iliad* to be the first, and yet the best epic poem that ever appeared in the world. Aristotle's poeticks are almost wholly taken up about it, forming precepts from that poet's practice. Some authors tell us, that Homer invented not only poetry, but all other arts and sciences ; and that there are visible marks of a perfect knowledge of every one of them to be seen in the *iliad*. There is a translation of this noble poem into our language, by the late ingenious Mr. Pope ; being, perhaps, the most elegant, and most in imitation of the original, of any attempt that way in any language whatever.

**ILIUM**, in anatomy, the third and last of the small guts, is situated principally below the navel, near the ossa ili ; whence its name. Its length is various : sometimes not more than fifteen, sometimes

twenty spans or more. Its beginning is where the valves of the jejunum cease to be conspicuous, and its end is where the larger intestines begin; in which place it is, in a very singular manner, inserted into the left side of the colon. It has no other valves except that great one at the end, which is called, by many, *valvula coli Bauhini*: its glands are, in general, more numerous towards the end than in any other part.

**ILIUM OS.** See **INNOMINATA OSSA**.

**ILL**, a river which rising near Basil, in Switzerland, runs north through Alsace, and having passed by Colmar, Schellstat, and Straßburgh, falls into the Rhine a little below the last city.

**ILLEGITIMATE.** See **LEGITIMATE**.

**ILLENOIS**, the inhabitants of a country contiguous to the illinois-lake, in Canada, in north America, which is situated between 88° and 93° of west long. and between 41° and 46° of north lat.

**ILLER**, a river of Germany, which rising in the mountains of Tyrol, runs north through Swabia, and falls into the Danube at Ulm.

**ILLEVIABLE**, in law, signifies any debt or duty that cannot be levied.

**ILLUSTRIOUS**, was antiently a title of honour in the roman empire, first given to the most distinguished among the knights who had a right to bear the *latus clavus*. Afterwards it was given to the first rank of the *honorati*, that is, to the *præfeti prætorii*, treasurers, *comites*, &c. There were, however different degrees among the illustrious; and as in Spain there are *grandees* of the first and second class, so in Rome they had their *illustres majores* and *minores*. The novels of Valentinian distinguish five classes of the illustrious, among whom the *illustres administratores* bore the first rank.

**ILMEN**, a lake in the province of Great Novogrod, in Russia, in 34° east long. and 58° north lat.

**ILMINSTER**, a market-town of Somersetshire, twenty-four miles south-west of Wells.

**ILOCK**, a town of Sclavonia, situated on the Danube, and subject to the house of Austria: east long. 20° 32', north lat. 45° 33'.

**ILS**, a river of Germany, which rising in the mountains of Bohemia, runs south and falls into the Danube at Passau.

**ILSLEY**, a market-town of Berkshire, ten miles north-west of Reading.

**IMAGE**, in a religious sense, is an artificial representation or similitude of some person or thing, used either by way of decoration and ornament, or as an object of religious worship and veneration; in which last sense, it is used indifferently with the word *idol*. See **IDOL**.

There is no doubt but that these images, or idols, were at first of the plainest and most simple materials; and as in the early ages people had but little skill in sculpture, it is probable that they made choice of such materials as were most easily wrought and fashioned into the intended figure; from hence it is not unlikely that the first images were made of earth, and that to give them some beauty, they were painted with different colours. Thus Pliny tells us, that Tarquinius Priscus caused a statue of Jupiter Capitolinus to be made of earth and painted red. Next to earth, wood seems to have been the most common material for images; but in length of time they were made of brass, silver, and gold. For the worship of images, see the articles **GODS** and **IDOLATRY**.

The worship of images among the christians, occasioned great contests both in the eastern and western churches; but at length this worship, in spite of all opposition made against it, was allowed and enjoined.

The roman catholics boast of the miraculous effects of the images of their saints. The image of Jesus Christ, which feeling itself wounded with a dagger by an impious wretch, laid its hand upon the wound, is famous at Naples. It is pretended that the image of St. Catherine of Sienna, has often driven out devils, and wrought other miracles: and that the lady of Lucca, when insolently assaulted by a soldier, who threw a stone at her, and had like to have broken the head of the child Jesus, whom she held on her right arm, immediately set him on her left, and the child liked sitting on that arm so well, that since that accident, he has never changed his situation.

As to the greek church, tho' they reject the use of graven images and statues, they pay a boundless veneration to pictures, and upon solemn festivals plant the picture of the saint to whom the church is dedicated in the center of the church; and every person present salutes it not by kneeling or prostration, but by giving it a kiss. If the picture represents

our

our blessed Lord, they kiss its feet; if the virgin Mary, its hands; but if it be any other saint, they approach it with more familiarity, and kiss its cheek. Before these pictures they also address their prayers.

**IMAGINATION**, a power or faculty of the mind, whereby it conceives and forms ideas of things communicated to it by the outward organs of sense.

Lord Bacon, having divided the doctrine of the mental faculties into logics and ethics, considers the imagination as performing the office of an agent or ambassador on both sides, and assisting alike in the judicial and ministerial capacity. Sense, according to him, commits all sorts of notions to the imagination, and reason afterwards judges of them. In like manner, reason transmits select and approved notions to the imagination before the decree is executed; for imagination always precedes and excites voluntary motion, and is therefore a common instrument both to the reason and the will; only it has two faces, that turned towards reason bearing the effigy of truth, but that towards action, the effigy of goodness, yet so as to appear the effigies of sisters.

Mr. Boyle says, that there are many instances in physic-books of diseases arising from imagination, particularly where the disease is excessively dreaded; adding, that he knew a lady who had the small-pox by this means: nor is it only in women that imagination has these effects, for he tells us of a man whose hair was suddenly changed from a fear of his going to be put to death. The remembrance of a loathsome potion will often produce a horror, attended with a sensible commotion of the whole body, and a kind of convulsion about the stomach. Shame, we see, occasions the blood to be plentifully thrown up into the face, as will also great and sudden joy. Longing in women may be supposed to create great alteration in the body of the mother, since it will leave such lasting and strong impressions upon that of the infant. And Mr. Boyle tells us of a young lady who washing in St. Winifrid's well, and fixing her eyes very attentively upon the red pebble-stones which in a scattered order made a large part of those that appeared through the water, a while afterwards grew big, went her time, and was delivered of a child, whose skin was plentifully speckled with spots of

the colour and magnitude of these stones. We have had lately an ingenious poem, in English, upon the pleasures of the imagination; and Addison's essays upon that subject in the *Spectator*, as well as Hutchinson's treatise on beauty and virtue, deserve the attention of such as desire to be informed in this branch of philosophy.

**IMAM**, a name applied by the mahometans to him who is head of the congregations in their mosques; and by way of eminence to him who has the supreme authority both in respect to spirituals and temporals.

There are subordinate imams in each town who represent the chief imam, but only with respect to religion. When the imam of the musfulman religion is mentioned without distinction, it is always restricted to the rightful and lawful successor of Mahomet, the fountain both of secular and sacred jurisdiction. The mahometans are not perfectly agreed concerning the dignity of some of the circumstances of this office: some hold the imamate to be settled by divine right, like the aaronical priesthood, in one family: others think it not so unalterably tied to genealogy and descent, as to hinder its passing from one family to another; and they say that an imam may be deposed for vicious conduct, and his office conferred on another.

The schiites, or disciples of Ali, maintain, that this privilege belongs to the family of Ali exclusive of all others; Ali being sole heir to Mahomet: hence, they own no person for the head of religion, who cannot prove his descent in a right line from this first imam. There are imams belonging to particular mosques, who are in the nature of our parish-priests.

**IMBARGO**, or **EMBARGO**, in naval affairs. See the article **EMBARGO**.

**IMBECILITY**, a languid, infirm state of body; which, being greatly impaired, is not able to perform its usual exercises and functions.

**IMBEZLE**, signifies to steal, pilfer, or purloin, and also to waste or diminish goods, &c. entrusted to a person's charge and care. Imbezlers of wool forfeit double damages, and may be committed to the house of correction till paid; and servants embezling their master's goods to the value of 40s. are deemed guilty of felony without benefit of clergy.

**IMBIBING**, the action of a dry porous body, that absorbs or takes up a moist or fluid

fluid one : thus, sugar imbibes water ; a sponge, the moisture of the air, &c. See **MOISTURE**, **HYGROMETER**, &c.

**IMBRICATED**, among botanists, an appellation given to such leaves of plants, as are placed over one another like the tiles of a house.

The term imbricated is likewise applied to some of the heart shells, from their being ridged transversely in the same manner.

**IMENSAT**, a town of Germany, in the circle of Swabia, situated in east long.  $10^{\circ} 8'$ , north lat.  $47^{\circ} 25'$ .

**IMITATION**, in literary matters, the act of doing or striving to copy after, or become like to, another person or thing.

Du Bos observes, that the principal merit of poems and pictures, consists in the imitation of such objects as would have excited real passions ; and that the passions which these imitations give rise to, are only superficial, and not so strong as that of the object imitated, and are therefore soon effaced. He also maintains, that the imitation of tragic objects in poems and pictures, afford most pleasure : we listen, therefore, with pleasure to those unhappy men who make a recital of their misfortunes by means of a painter's pencil, or of a poet's verses ; but, as Diogenes Laertius observes, it would afflict us extremely, were we to hear them bewailing their sad disasters in person. The too great impressions these imitations make upon man, was the reason of Plato's excluding them from his republic. Poets and painters cannot choose too engaging a subject for their imitation, since the principal charm of these two arts, as Du Bos observes, proceeds from the imitation of objects capable of engaging us.

Imitation, says he, ought not to be servile, but like that which Horace, Virgil, and many other good writers made use of, who preceded them ; that is, by following the genius of the language in which they composed, and taking nature for their first model.

**IMITATION**, in music, a particular way of composition wherein each part is made to imitate the other, either throughout the whole piece, which is one of the kinds of canon ; or only during some measures, which is a simple imitation. Sometimes the motion or figure of the notes is only imitated, and that often by a contrary motion, which makes what they call a retrograde imitation.

Imitation differs from a fugue, says Mr Brossard, in regard in the former the repetition must be a second, third, sixth seventh, or ninth, either above or below the first voice or guide ; to which it may be added, that it may be at any interval, and differs properly from fugue, in that in imitation the intervals may not be precisely the same ; whereas were the repetition to an unison, fourth, fifth, or octave, higher or lower, and the intervals exactly the same in the comes and guide, it would be a fugue.

**IMMACULATE**, something without stain, chiefly applied to the conception of the holy virgin. See **CONCEPTION**.

**IMMANENT**, in logic. The schoolmen distinguish two kinds of actions, the one transient, which pass from the agent to the patient, the other immanent, which continue in the agent. See **ACT**.

**IMMATERIAL**, something devoid of matter, or that is pure spirit : thus God, angels, and the human soul are immaterial beings. See the articles **GOD**, **ANGEL**, and **SOUL**.

**IMMEDIATE**, whatever is capable of producing an effect without the intervention of external means ; thus we say, an immediate cause, in opposition to a mediate or remote one. See **CAUSE**.

**IMMEDIATE MODE**. See **MODE**.

**IMMEMORIAL**, in law, an epithet given to the time or duration of any thing, whose beginning we know nothing of.

In a legal sense, a thing is said to be of time immemorial, or time out of mind, that was before the reign of king Edw. II.

**IMMENSITY**, an unlimited extension, or which no finite and determinate space, repeated ever so often, can equal. See the article **INFINITY**.

**IMMERETTA**, a province of asiatic Turkey, situated between Georgia and the Euxine sea.

**IMMERSION**, that act by which any thing is plunged into water, or other fluid. See the article **FLUID**.

It is used in chemistry for a species of calcination, when any body is immersed in a fluid to be corroded ; or it is a species of lotion, as when a substance is plunged into any fluid in order to deprive it of a bad quality, or communicate to it a good one.

**IMMERSION**, in astronomy, is when a star or planet is so near the sun with regard to our observations, that we cannot see it ; being, as it were, enveloped and hid in the rays of that luminary. It also denotes

denotes the beginning of an eclipse of the moon, or that moment when the moon begins to be darkened, and to enter into the shadow of the earth; and the same term is also used with regard to an eclipse of the sun, when the disk of the moon begins to cover it. In this sense emerſion ſtands oppoſed to immerſion, and ſignifies the moment wherein the moon begins to come out of the ſhadow of the earth, or the ſun begins to ſhew the parts of his diſk which were hid before. See the article ECLIPSE.

Immersion is frequently applied to the ſatellites of Jupiter, and eſpecially to the firſt ſatellite; the obſervation whereof is of ſo much uſe for diſcovering the longitude. The immerſion of that ſatellite is the moment in which it appears to enter within the diſk of jupiter, and its emerſion the moment when it appears to come out.

The immerſions are obſerved from the time of the conjunction of jupiter with the ſun, to the time of his oppoſition; and the emerſions from the time of his oppoſition to his conjunction.

The peculiar advantage of theſe obſervations is, that during eleven months of the year, they may be made at leaſt every other day. The perfection of this theory and the praxis thereon, we owe to Mr. Caſſini.

**IMMORTAL**, that which will laſt to all eternity; as having in it no principle of alteration or corruption: thus God and the human ſoul are immortal. See the articles GOD and SOUL.

**IMMUNITY**, a privilege or exemption from ſome office, duty, or impoſition, as an exemption from tolls, &c.

Immunity is more particularly underſtood of the liberties granted to cities and communities.

**IMMUTABILITY**, one of the divine attributes, founded on the abſolute perfection of the deity. See GOD.

The immutability of God is two-fold, physical and moral. The firſt conſiſts in this, that the divine eſſence does not, nor poſſibly can, receive any alteration; and the moral immutability is founded on the perfection of his nature, whereby he always wills the ſame things, or ſuch as are beſt on the whole.

**IMOLA**, a city of Italy, ſeventeen miles eaſt of Bologna, ſubject to the pope.

**IMPALED**, in heraldry; when the coats of a man and his wife who is not an heiress are borne in the ſame eſcutcheon,

they muſt be marſhalled in pale; the huſband's on the right ſide, and the wife's on the left: and this the heralds call baron and feme, two coats impaled.

If a man has had two wives, he may impale his coat in the middle between theirs; and if he has had more than two, they are to be marſhalled on each ſide of his in their proper order.

**IMPALPABLE**, that whoſe parts are ſo extremely minute that they cannot be diſtinguiſhed by the ſenſes, particularly by that of feeling.

**IMPANATION**, a term uſed by divines, to ſignify the opinion of the lutherans with regard to the eucharift, who believe that the ſpecies of bread and wine remain together with the body of our Saviour after conſecration.

**IMPANELLING**, in law, ſignifies the writing down or entering into a parchment, liſt or ſchedule, the names of a jury ſummoned by the ſheriff to appear for ſuch public ſervices as juries are employed in. See the article PANNEL.

**IMPARLANCE**, in law, a petition in court for a day to conſider or adviſe what answer the defendant ſhall make to the plaintiff's action; and is the continuance of the cauſe till another day, or a longer time given by the court.

An imparlance is general or ſpecial; general is when it is entered in general terms, without any ſpecial claule therein; ſpecial is where the defendant deſires a further day to answer. And this laſt imparlance is of uſe to plead ſome matters, which cannot be pleaded after a general imparlance.

It is ſaid that imparlance was formerly from day to day, but now it is from one term to another. In caſe the plaintiff amends his declaration after the ſame is delivered or filed, the defendant may in courſe imparl to the next term afterwards, unleſs the plaintiff pays coſts; but if he does, and they are accepted, the defendant may not have an imparlance. Likewise the not delivering a declaration in time, is ſometimes the cauſe of imparlance; and when the plaintiff declares, yet does not proceed in three terms after, in ſuch caſe the defendant may imparl to the next ſucceeding term. But there are divers caſes wherein imparlances are not to be given, as where a perſon is ſued by an attorney or any other privileged perſon of the court in an aſſiſe, one may not imparl except good cauſe be given, nor ſhall there be impar.

imparlancei n action of special claufum fregit, &c.

**IMPARSONNEE**, or a parfon imparfonee, in law. See the article **PARSON**.

**IMPASSIBLE**, that which is exempt from fuffering, or cannot undergo pain or alteration.

The ftoics place the foul of their wife man in an impaffible, or imperturbable ftate. See the article **STOIC**.

**IMPASTATION**, the mixtion of various materials of different colours and confiftencies, baked or bound together with fome cement, and hardened either by the air or by fire.

**IMPASTATION**, in mafonry, a term ufed for a work made of ftucco, or ftone, beaten and wrought up in manner of a paffe.

Some authors are of opinion, that the obelifks and the huge antique columns ftill remaining, were made by impaftation.

**IMPASTING**, or **EMPASTING**, in painting. See the article **EMPASTING**.

**IMPATIENS**, **TOUCH-ME-NOT**, in botany, a genus of plants otherwife called **balsamina**. See **BALSAMINA**.

This plant is faid to be fo ftrong a diuretic, as to bring on a diabetes.

**IMPEACHMENT**, an accusation and profecution for treason and other crimes and mifdemaneors. Any member of the lower houfe of parliament may impeach any one belonging either to that body, or to the houfe of lords. The method of proceeding, is to exhibit articles on the behalf of the commons, by whom managers are appointed to make good their charge. Thefe articles are carried to the lords, by whom every perfon impeached by the commons is always tried; and if they find him guilty, no pardon under the great feal can be pleaded to fuch an impeachment. 12 Will. III. cap. ii.

**IMPEACHMENT of waffe**, is a prohibition or refraint from committing of waffe upon lands or tenements. This term alfo fignifies a demand of fatisfaction for waffe committed by a tenant, who has only a particular eftate in the land granted, as for life or years. Yet a perfon that holds lands on leafe containing this claufe, *viz.* to hold without impeachment of waffe, has thereby fuch an intereft in the lands, &c. that he may commit waffe without being impeached or queftioned for it.

**IMPEDIMENTS**, in law, are fuch hindrances as put a ftop, or ftay, to a perfon's seeking for his right by due courfe of law.

Perfons under impediments are thofe that are either under age, or under cover, that are non compos mentis, in prifon, beyond fea, &c. who by our ftatutes are allowed time to claim and profecute their rights, after fuch impediments are removed, efpecially in cafe of fines levied.

**IMPENETRABILITY**, in philofophy, that property of body, whereby it cannot be pierced by another: thus, a body, which fo fills a fpace as to exclude all others, is faid to be impenetrable. See the articles **BODY**, **EXTENSION**, &c.

**IMPERATIVE**, one of the moods of a verb, ufed when we would command, entreat or advife: thus, *go, read, take pity, be advifed*, are imperatives in our language; but in the learned languages, this mood has a peculiar termination to diftinguifh it from others, as *i*, or *ito*, *ge*; *lege*, or *legito*, *read*, &c. and not only fo, but the termination varies, according as you addrefs one or more perfons, as *audi* and *audite*; *αυείλω*, *αυείλων*, *αυείλωσαν*, &c.

**IMPERATOR**, in roman antiquity, a title of honour conferred on victorious generals, by their armies, and afterwards confirmed by the fenate.

**IMPERATORIA**, **MASTER-WORT**, in botany, a genus of the *pentandria digynia* clafs of plants, the general corolla of which is uniform; the fingle flowers are compofed each of five inflexo-cordate and nearly equal petals; the fruit is naked, round, compreffed, and feparable into two parts; the feeds are two, oval, furrowed with two lines on one fide, and furrounded with a broad margin.

The root of this plant is cordial and fudorific, and is an ingredient in many compofitions.

**IMPERATRIX**, in botany, the fame with meum, or fpignel. See the article **MEUM**.

**IMPERFECT**, fomething that is defective, or that wants fome of the properties found in other beings of the fame kind: thus moifes are called imperfect plants, becaufe almofl all the parts of fructification are wanting in them; and for the like reafon, is the appellation imperfect given to the fungi and submarine plants. See **MOSS**, **FUNGI**, and **SUBMARINE**.

**IMPERFECT FLOWERS**, thofe otherwife called ftamineous. See the article **STAMINEOUS**.

**IMPERFECT NUMBERS**, fuch whole aliquot parts taken together, do either exceed or fall fhort of that whole number of which they are parts; they are either abundant



abundant or deficient. See the articles **ABUNDANT** and **DEFICIENT**.

**IMPERFECT TENSE**, in grammar, a tense that regards some præterite tense, or denotes the thing to be at that time present, and not quite finished; as *scribebam, I was writing*.

**IMPERIAL**, something belonging to an emperor or empire, as imperial crown, imperial chamber, imperial cities, imperial diet, &c. See **CROWN**, **CHAMBER**, **CITY**, **DIET**, &c.

**IMPERIAL** is also a city and port-town of the province of Chili, in south America, situated in west lon. 80°, north lat. 39°.

**IMPERSONAL VERB**, in grammar, a verb to which the nominative of any certain person cannot be prefixed; or, as others define it, a verb destitute of the two first and primary persons, as *decet, oportet*, &c. The impersonal verbs of the active voice end in *t*, and those of the passive in *tur*; they are conjugated thro' the third person singular of almost all the tenses and moods: they want the imperative, instead of which we use the present of the subjunctive; as *pœniteat, pugnetur*; nor, but a few excepted, are they to be met with in the supines, participles, or gerunds.

**IMPERVIOUS**, a thing not to be pervaded, nor passed through, either by reason of the closeness of its pores, or the particular configuration of its parts.

**IMPETIGO**, in medicine, a name by which the leprosy of the Greeks is sometimes called. See **LEPROSY**.

**IMPETIGO** is also a species of itch, attended with dry scales or scurf, and an uneasy pruriginous itching. See **ITCH**.

**IMPETRATION**, in law, the obtaining any thing by request or prayer: but in our old statutes, it is taken for the pre-obtaining of church benefices in this realm, from the court of Rome, which lie in the disposition and gift of the king and other lay-patrons of this land.

**IMPETUS**, in mechanics, the force with which one body impels or strikes another. See **MOMENTUM**, **GUNNERY**, &c.

**IMPING**, in falconry, the inserting of a feather in the wing of an hawk, in the place of one that is broken.

**IMPLANTATION**, the same with transplantation. See **TRANSPLANTATION**.

**IMPLEAD** signifies to sue or prosecute by due course of law.

**IMPLEMENTS** is used for all things necessary for a trade, or the furniture of an household; in which sense, it is frequent-

ly used in wills, conveyances of moveables, &c.

**IMPLICITE**, something tacitly comprised or understood; that is, contained in a discourse, clause, or proposition, not in express terms, but only by induction and consequence.

**IMPLICATION**, in law, is where something is implied, that is not expressed by the parties themselves in their deeds, contracts, and agreements.

In this case, the want of words may be supplied by implication. Thus, where a husband by will devises all the goods in his house, to his wife; and after her decease, bequeaths his house and those goods to his son, it is implied, in law, that the widow is to have the house for life; because though the son might have had it, he is not mentioned by will to have any thing till after the decease of the mother. But it is otherwise, where a person devises part of his lands to his wife for life, and the part so devised, with all the rest of his lands to the youngest son, and his heirs, after the wife's decease: in this case, as there is no express devise of the rest of the lands to the wife, she cannot have them by implication; for since the eldest son, who is heir at law, is not excluded, he shall have them during his mother's life, and till the devise to the youngest son takes effect.

**IMPORTATION**, in commerce, the bringing merchandize into a kingdom from foreign countries; in contradistinction to exportation. See **EXPORTATION**.

We shall here give some of the principal laws relating to the importation of goods into this kingdom. Goods imported without entry, or paying customs, are forfeited; and the lord-treasurer, the barons of the exchequer, or chief magistrates of the place where the offence was committed, or next adjoining to it, may grant a warrant to any person, who, with the assistance of a constable, may break open doors, chests, &c. and take thence any prohibited or unaccustomed goods; but this is to be done, within one month after the offence was committed. But if false information is given, the person wrongfully accused, may recover costs and damages. See the article **DUTY**.

No ship or vessel arriving from beyond sea is to be above three days in sailing from Gravesend to the place of discharge on the river Thames, unless hindered by contrary winds or other impediment. And no ship bound for the port of London is

to touch or stay at any place adjoining to any shore, between Gravesend and Chester-quay. True entries are to be made of all such ships lading, upon oath of the master or purser for that voyage; also where she took in her lading, where she was built, how manned, who were the owners, and who the master during the voyage. In all out-ports, ships are to come directly to the place of unloading, and make true entries as aforesaid, upon penalty of the forfeiture of 100*l*.

After any ship is cleared, and the watchmen and tidefmen discharged from their attendance, if there be found on board any concealed goods that have not paid the duty inwards, the master, or other person taking charge of the ship, shall forfeit 100*l*.

Porters, carmen, watermen, &c. assisting in landing unaccustomed goods, shall, on conviction, for the first offence, be committed to the next jail till they find security for their good behaviour; and for their second offence, they are to be committed to prison for two months, without bail or mainprize, or till they are discharged by the court of exchequer, or each of them pay 5*l*. to the sheriff of the county.

No merchant-denizen shall cover a stranger's goods, but shall, by himself or agent, sign one of his bills of every entry, with the mark, number, and contents of every parcel of goods, without which no entry shall pass. And no children of aliens under the age of twenty-one years, shall have entry made in their names, nor be permitted to trade.

Merchants, trading into the port of London, shall have free liberty to lade and unlade their goods at any of the lawful quays between the Tower and London-bridge, from sun-rising to sun-setting, from September 10, to March 10; and between six o' clock in the morning and six in the evening, from March 10, to September 10; giving notice thereof to the respective officers, appointed to attend the lading and unlading of goods. And such officers as shall refuse to be present, shall forfeit 5*l*. for every default.

To prevent combination between importers, and seizers of goods unlawfully imported or exported, none shall seize them but the officers of the customs, or such as shall be authorised so to do by the lord treasurer, under-treasurer, or a special commission from his majesty, under the great or privy seal.

If any seizer of prohibited or unaccustomed goods does not make due prosecution thereof, it is lawful for the custom-house officers, or others deputed thereto, to make seizure of such goods, and they shall be, in law, adjudged the first true informers and seizers, and have the benefit thereof, notwithstanding any law and statute to the contrary.

All foreign goods permitted to be landed by bills at sight, bills at view or suffrance, shall be landed at the most convenient quays and wharfs, as the officers of the customs shall direct; and there, or at the king's storehouse of the respective ports, shall be measured, weighed, numbered, &c. by the officers appointed, who shall perfect the entry, and subscribe their names to it, and the next day make their report to the customer, collector, or comptroller; or in default thereof, shall forfeit 100*l*.

Any merchant who shall import goods, shall have liberty to break bulk in any lawful port or quay, the master or purser first making oath of the true contents of the ship's lading. No english merchant shall put on shore in Scotland or Ireland, any merchandize of the growth or produce of any of his majesty's plantations, unless the same have been first landed in England, Wales, or Berwick, and paid the duties with which they are chargeable, under the penalty of forfeiting the ship and goods, three fourths to the king, and one fourth to the informer, or he that shall sue for the same: but if a ship be disabled, or driven into any port of Ireland, and unable to proceed on her voyage, her goods may be put on shore, under the hands of the principal officers of the customs there residing, till the goods can be put on board some other vessel, to be transported to some part of England or Wales.

Natives of England or Ireland may import into England, directly from Ireland, any hemp, flax, thread, yarn, and linnen, of the growth and manufacture of Ireland, custom-free; the chief officer so importing bringing a certificate from the chief office in Ireland, expressing the particulars of the goods, with the names and places of abode of the exporters thence, and of such as have sworn that the said goods are, bona fide, of the growth and manufacture of that kingdom, and who they are assigned to in England; and the chief officer shall make oath, that the said goods are the same that are on board, by virtue of that certificate.

**IMPOSITION** of hands, a religious ceremony, in which a bishop lays his hand upon the head of a person, in ordination, confirmation, or in uttering a blessing. This practice is also generally observed by the dissenters at the ordination of their ministers, when all the ministers present place their hands upon the head of him whom they are ordaining, while one of the body prays for a blessing on him and his future labours.

Imposition of hands was a jewish ceremony, introduced not by any divine authority, but by custom; it being the practice of those people, whenever they prayed for any person, to lay their hands on his head. Our Saviour observed the same ceremony both when he conferred his blessing on the children, and when he cured the sick: the apostles also laid hands on those, upon whom they conferred the Holy Ghost. In the antient church, imposition of hands was even practised in marriage, which custom is still observed by the Abyssinians.

However, the use of this term, which in its original signification was general, is now restrained, by custom, to the laying on of hands practised in ordination.

**IMPOSSIBLE**, that which cannot be done or effected.

A proposition is said to be impossible, when it contains two ideas, which mutually destroy each other, and which can neither be conceived nor united together in the mind: thus, it is impossible, that a circle should be a square, because we conceive clearly that squareness and roundness destroy each other by the contrariety of their figure.

Impossibilities are of three kinds, *viz.* metaphysical, physical, and moral. A thing is metaphysically impossible, when it cannot be done even by divine power; as that a square should be round, &c. those ideas, as was already observed, destroy each other, imply a contradiction, and are, strictly speaking, nothing at all, in regard that what is affirmed, is at the same time denied: this impossibility is otherwise termed absolutely impossible.

A thing is said to be physically impossible, that cannot be done by any natural powers, as the resurrection of the dead: this is otherwise termed *impossibile creaturae*, or impossible with regard to the creature.

A thing is morally impossible, when, of its own nature, it is possible; but yet is attended with such difficulties, as that,

all things considered, it appears impossible: thus, it is morally impossible that all men should be virtuous, or that a man should throw the same number with three dice an hundred times successively.

But with greater propriety a thing is said to be morally impossible, when it is repugnant to good sense and decency, or contrary to the laws of nature: thus the lawyers say, *omne turpe est impossibile*: these conditions are impossible, therefore, which sense and decorum do not allow to be performed, though in themselves very possible to those who have no regard to good sense, &c.

**IMPOST**, in law, signifies in general a tribute or custom, but is more particularly applied to signify that tax which the crown receives for merchandizes imported into any port or haven. See **DUTY**. Some, notwithstanding, distinguish imposts from customs, which last are rather the profits arising to the king from goods exported. See the article **CUSTOMS**.

**IMPOSTS**, in architecture, the capitals of pilars, or pilasters, which support arches.

An impost, sometimes called chaprel, is a sort of plinth, or little cornice, which crowns a pier, and supports the first stone whence an arch or vault commences. The imposts are conformable to their proper orders. The tuscan has only a plinth; the doric has two faces crowned; the ionic, a larmier, or crown over the two faces, and its mouldings may be carved; the corinthian and composite have a larmier, frieze, and other mouldings. See the articles **TUSCAN**, **DORIC**, &c.

The projectures of the imposts must not exceed the naked of the pilaster: sometimes the entablature of the order serves for the impost of the arch, and this has a very grand and stately appearance. The impost is a thing very essential to the composition of the ordonnances, inasmuch that without it, in the place where the curve-line of the arch meets with the perpendicular line of the pillar, there always seems a kind of elbow.

**IMPOSTHUME**, in surgery, &c. the same with abscess. See **ABSCESS**.

**IMPOTEENCE**, or **IMPOTENCY**, in general, denotes want of strength, power, or means to perform any thing.

Divines and philosophers distinguish two sorts of impotency, natural and moral; the first is a want of some physical principle, necessary to an action; or where a being is absolutely defective, or not free  
and

and at liberty to act : the second only imports a great difficulty, as a strong habit to the contrary, a violent passion, or the like.

Impotency is, more particularly, used for a natural inability to coition. Impotence with respect to men, is the same as sterility in women; that is, an inability of propagating the species. There are many causes of impotence, as a natural defect in the organs of generation, which seldom admits of a cure: accidents, or diseases; and in such cases the impotence may, or may not be remedied, according as these are curable or otherwise. But there is reason to believe that the most frequent causes of impotence are preposterous methods of venery, and too often repeated venereal injuries. See the article GONORRHOEA.

Dr. James thinks that a sudden impotence happening to a man not accustomed to any disorders of that kind, and not accountable for from any preceding accidents, is a fore-runner of some great disorder; and that, in such cases, provocatives are very dangerous, because it is possible they may increase the disorder which causes the impotence, and make it fatal. Hippocrates advises a man who has a mind to get children, not to get drunk, nor drink white-wine, but that which is strong and unmixed, nor to use the warm bath.

Another principal cause of impotence is the vicious habit of drinking spirits, that is, drams and the like.

**IMPRACTICABLE CASE**, in algebra, that otherwise called irreducible. See the article IRREDUCIBLE.

**IMPRECATION**, a curse, or wish that evil may befall any one. See the article EXECRATION.

**IMPREGNATION**, the getting a woman with-child. See PREGNANCY.

The term impregnation is also used, in pharmacy, for communicating the virtues of one medicine to another, whether by mixture, coction, digestion, &c. See the articles MIXTURE, COCTON, &c.

**IMPRESSION** is applied to the species of objects, which are supposed to make some mark or impression on the senses, the mind, and the memory.

The peripatetics assert, that bodies emit species resembling them, which are conveyed to the common sensorium, and there are rendered intelligible by the active intellect; and when thus spiritualized, are called expressions, or expi-  
often

species, as being expressed from the others.

**IMPRESSION** also denotes the edition of a book, regarding the mechanical part only; whereas edition, besides this, takes in the care of the editor, who corrected or augmented the copy, adding notes, &c. to render the work more useful. See the article EDITOR.

**Privilege for IMPRESSION**. See the article PRIVILEGE.

**IMPREST, Auditors of**. See the article AUDITOR.

**IMPREST-MONEY**, the money paid at the enlisting of soldiers.

**IMPRISONMENT**, the state of a person restrained of his liberty, and detained under the custody of another.

No person is to be imprisoned but as the law directs, either by the command or order of a court of record, or by lawful warrant; or the king's process, on which one may be lawfully detained. And at common law, a person could not be imprisoned unless he were guilty of some force and violence, for which his body was subject to imprisonment, as one of the highest executions. Where the law gives power to imprison, in such case it is justifiable, provided he that does it in pursuance of a statute, exactly pursues the statute in the manner of doing it, for otherwise it will be deemed false imprisonment, and of consequence it is unjustifiable. Every warrant of commitment for imprisoning a person, ought to run, "Till delivered by due course of law," and not "Until farther order;" which has been held ill, and thus it also is, where one is imprisoned on a warrant not mentioning any cause for which he is committed.

A person being sent to prison by a warrant from a secretary of state, without assigning any cause, &c. it was adjudged, that he ought to be discharged for that reason. Persons may also, by bail or habeas corpus, be discharged from their imprisonment in any case bailable. See the articles HABEAS CORPUS, BAIL, PRISON, and PRISONER.

**IMPROPER FRACTIONS**, in arithmetic. See the article FRACTION.

**IMPROPRIATION**, a parsonage or ecclesiastical living, the profits of which are in the hands of a layman; in which sense, it stands distinguished from appropriation, which is where the profits of a benefice are in the hands of a bishop, college, &c. though these terms are now

often used promiscuously. See the article **APPROPRIATION**.

**IMPULSE**, or **IMPULSIVE FORCE**, in mechanics, the same with impetus. See the article **IMPETUS**.

**IMPURITY**, in the law of Moses, is any legal defilement. Of these there were several sorts; some were voluntary, as the touching a dead body, or any animal that died of itself, or any creature that was esteemed unclean; or the touching things holy, by one who was not clean, or was not a priest; the touching one who had a leprosy, one who had a gonorrhœa, or who was polluted by a dead carcass, &c. Sometimes these impurities were involuntary, as when any one inadvertently touched bones, or a sepulchre, or any thing polluted; or fell into such diseases as pollute, as the leprosy, &c.

The beds, cloaths, and moveables which had touched any thing unclean, contracted also a kind of impurity, and in some cases communicated it to others.

These legal pollutions were generally removed by bathing, and lasted no longer than the evening. The person polluted plunged over head in the water, and either had his cloaths on when he did so, or washed himself and his cloaths separately. Other pollutions continued seven days, as that which was contracted by touching a dead body. That of women in their monthly courses lasted till this was over with them. Other impurities lasted forty or fifty days, as that of women who were lately delivered, who were unclean forty days after the birth of a boy, and fifty after the birth of a girl. Others again lasted till the person was cured. Many of these pollutions were expiated by sacrifices; and others by a certain water or lye, made with the ashes of a red heifer, sacrificed on the great day of expiation. When the leper was cured, he went to the temple, and offered a sacrifice of two birds, one of which was killed, and the other set at liberty. He who had touched a dead body, or had been present at a funeral, was to be purified with the water of expiation, and this upon pain of death. The woman who had been delivered, offered a turtle and a lamb for her expiation; or if she was poor, two turtles or two young pigeons.

These impurities, which the law of Moses has expressed with the greatest accuracy and care, were only figures of other more important impurities, such as the sins and

iniquities committed against God, or faults committed against our neighbour. The saints and prophets of the Old Testament were sensible of this; and our Saviour, in the gospel, has strongly inculcated, that they are not outward and corporeal pollutions which render us unacceptable to God, but such inward pollutions as infect the soul, and are violations of justice, truth, and charity.

**IMPUTATION**, in general, the charging something to the account of one, which belonged to another: thus, the assertors of original sin maintain, that Adam's sin is imputed to all his posterity. See the article **ORIGINAL SIN**.

In the same sense, the righteousness and merits of Christ are imputed to true believers. See the article **JUSTIFICATION**.

**INACCESSIBLE**, something that cannot be come at, or approached, by reason of intervening obstacles, as a river, rock, &c. It is chiefly used in speaking of heights and distances. See the articles **HEIGHT** and **DISTANCE**.

**INACTIVITY** of matter. See **INERTIA**.

**INADEQUATE IDEA**. See **IDEA**.

**INALIENABLE**, that which cannot be legally alienated or made over to another: thus the dominions of the king, the revenues of the church, the estates of a minor, &c. are inalienable, otherwise than with a reserve of the right of redemption.

**INAMELLING**, or **ENAMELLING**. See the article **ENAMELLING**.

**INANIMATE**, a body that has either lost its soul, or that is not of a nature capable of having any.

**INANITION**, among physicians, denotes the state of the stomach when empty, in opposition to repletion.

**INARCHING**, in gardening, is a method of grafting, commonly called grafting by approach, and is used when the stock intended to graft on, and the tree from which the graft is to be taken, stand so near, or can be brought so near, that they may be joined together. The method of performing it, is as follows: take the branch you would inarch, and having fitted it to that part of the stock where you intend to join it, pare away the rind and wood on one side, about three inches in length. After the same manner cut the stock or branch in the place where the graft is to be united, so that the rind of both may join equally together; then cut a little tongue upwards in the graft, and make a notch in the stock to admit it; so that when they are

joined, the tongue will prevent their slipping, and the graft will more closely unite with the stock. Having thus placed them exactly together, tie them with some bays, or other soft tying; then cover the place with grafting clay, to prevent the air from entering to dry the wound, or the wet from getting in to rot the stock: you should also fix a stake in the ground, to which that part of the stock, together with the graft, should be fastened, to prevent the wind from breaking them asunder, which is often the case, when this precaution is not observed. In this manner they are to remain about four months, in which time they will be sufficiently united, and the graft may then be cut from the mother tree, observing to slope it off close to the stock; and if at this time you cover the joined parts with fresh grafting-clay, it will be of great service to the graft.

This operation is always performed in April or May, and is commonly practised upon myrtles, jasmynes, walnuts, firs, pines, and several other trees that will not succeed by common grafting, or budding.

**INAUGURATION**, the coronation of an emperor or king, or the consecration of a prelate: so called from the ceremonies used by the Romans, when they were received into the college of augurs. See **CORONATION**, **CONSECRATION**, &c.

**INCA**, or **YNCA**, a name given by the natives of Peru to their kings, and the princes of the blood. Pedro de Cieza, in his Chronicle of Peru, gives the origin of the incas, and says, that that country was, for a long time, the theatre of all manner of crimes, of war, dissention, and the most dreadful disorders, till at last two brothers appeared, one of whom was called Mangocapa; of this person, the Peruvians relate many wonderful stories. He built the city of Cusco, made laws, established order and harmony by his wise regulations, and he and his descendants took the name of inca, which signifies king or great lord. These incas became so powerful, that they rendered themselves masters of all the country from Paito to Chili, and from the river Maule on the south, to the river Augasfinago on the north; these two rivers forming the bounds of their empire, which extended above thirteen hundred leagues in length. This they enjoyed till the divisions between inca Guascar and Atabalipa, which the Spaniards laying hold of, made them-

selves masters of the country, and destroyed the empire of the incas.

**INCAMERATION**, a term used in the chancery of Rome, for the uniting of lands, revenues, or other rights, to the pope's domain.

**INCANTATION**, denotes certain ceremonies, accompanied with a formula of words, and supposed to be capable of railing devils, spirits, &c. See the articles **CHARM**, **CARMEN**, &c.

**INCAPACITY**, in the canon-law, is of two kinds: 1. The want of a dispensation for age in a minor, for legitimization in a bastard, and the like: this renders the provision of a benefice void in its original. 2. Crimes and heinous offences, which annul provisions at first valid.

**INCARNATION**, in theology, the act whereby the second person of the holy Trinity assumed the human nature, viz. a true body and reasonable soul, in order to accomplish the redemption of fallen mankind. See **TRINITY** and **REDEMPTION**. This fundamental doctrine of christianity is very expressly taught in scripture: thus, in Gal. iv. 4. it is said, "God sent forth his son, made of a woman:" and 1 John iv. 14. "And we have seen and do testify, that the Father sent the Son to be the saviour of the world."

The generation of Christ was miraculous, as being conceived by the power of the Holy Ghost, and born of the Virgin Mary; from the time of which blessed nativity, the christian æra commences. See the article **EPOCHA**.

**INCARNATIVES**, in surgery, medicines which assist nature in filling up wounds or ulcers with flesh; or rather remove the obstructions thereto. See **VULNERARY**. Internal incarnatives are aliments which supply a balsamic chyle, and consequently generate flesh, and produce a full or plump habit.

**INCARNATIVE**, or **UNITING BANDAGE**, is a bandage of the head, so called from its being used to unite the lips of a wound. It is about two inches broad, having a longitudinal slit in its middle, about the length of three or four fingers breadth. See plate XXV. fig. 3. n° 6.

The chief use of this bandage is to retain the lips of a rectilinear wound close together, whether in the head, eye-lids, or other parts of the body. For the method of applying it, roll up each end, and after the wound has been dressed with proper balsams, and a plaster and two narrow compresses laid on each side, the slit

slit of the bandage is to be fixed near the wound, in such a manner, that one of its ends being carried round the head, and the roller being passed through the slit, both of the rollers are drawn tight, so as to bring the lips of the wound close together. The two rollers in each hand being then exchanged, and crossed upon the forehead, and the like being done under the chin, as long as the bandage will permit, each end of it is to be fastened by pins or suture. This bandage is not to be taken off till the lips of the wound may be supposed to be united; unless any urgent symptoms should require its removal.

**INCARTATION**, among chemists, the same with depart. See **DEPART**.

**INCENSE**, or **FRANK-INCENSE**, in the materia medica, &c. a dry resinous substance, known among authors by the names thus and **olibanum**. See the article **OLIBANUM**.

Incense is a rich perfume, with which the ancient pagans, and the roman catholics still, perfume their temples, altars, &c.

The burning of incense made part of the daily service of the antient jewish church. The priests drew lots to know who should offer it; the destined person took a large silver dish, in which was a centur full of incense; and being accompanied by another priest, carrying some live coals from the altar, went into the temple. There, in order to give notice to the people, they struck upon an instrument of brass placed between the temple and the altar; and being returned to the altar, he who brought the fire left it there, and went away. Then the offerer of incense having said a prayer or two, waited the signal, which was the burning of the holocaust; immediately upon which he set fire to the incense, the whole multitude continuing all the time in prayer. The quantity of incense offered each day, was half a pound in the morning, and as much at night.

One reason of this continual burning of incense might be, that the multitude of victims that were continually offered up, would have made the temple smell like a slaughter-house, and consequently have inspired the comers rather with disgust and aversion than awe and reverence, had it not been overpowered by the agreeable fragrance of those perfumes.

**INCEPTIVE**, a term used by Dr. Wallis to express such moments, or first prin-

ciples, which, though of no magnitude themselves, are notwithstanding capable of producing it. Thus, a point is inceptive of a line, and a line inceptive of surface, &c.

**INCEST**, the crime of venereal commerce between persons who are related in a degree wherein marriage is prohibited by the law of the country.

Some are of opinion that marriage ought to be permitted between kinsfolks, to the end that the affection so necessary in marriage might be heightened by this double tie, and yet the rules of the church have formerly extended this prohibition even to the seventh degree; but time has now brought it down to the third or fourth degree.

Most nations look on incest with horror, Persia and Egypt alone excepted. In the history of the antient kings of those countries we meet with instances of the brother's marrying the sister; the reason was, because they thought it too mean to join in alliance with their own subjects, and still more so to have married into any foreign family.

**INCEST SPIRITUAL**, a crime committed in like manner between persons who have a spiritual alliance by means of baptism or confirmation.

Spiritual incest is also understood of a vicar or other beneficiary, who enjoys both the mother and the daughter, that is, holds two benefices, the one whereof depends upon the collation of the other.

Such a spiritual incest renders both the one and the other of these benefices vacant.

**INCH**, a well known measure of length; being the twelfth part of a foot, and equal to three barley-corns in length. See **FOOT** and **MEASURE**.

**INCH OF CANDLE**, or sale by inch of candle. See the article **CANDLE**.

**INCHASING**, or **ENCHASING**. See the article **ENCHASING**.

**INCIDENCE**, in mechanics, denotes the direction in which one body strikes on another.

In optics, the angle **ACP**, (pl. **CXLIV**. fig. 2. n<sup>o</sup> 1.) made by the ray **AC**, and the perpendicular **PC**, is called the angle of incidence; but Dr. Barrow, and some others, call it the angle of inclination; and by the angle of incidence understand its complement **ECA**.

Mr. Molyneux, in his *Dioptrics*, uses the words inclination and incidence promiscuously, and by the angle of inci-

dence or inclination, always intends the angle ACP.

The angle PCB, is called the angle of reflection, and is always equal to the angle of incidence ACP; which is thus proved :

Every ray of light goes the shortest way that possibly it can : thus, if you suppose the ray AC. (*ibid.*) to fall on the plain glass or surface EG, and thence to be reflected to B, so that the angle ACE be equal to BCG; then will AC and CB, be the two shortest lines that can possibly be drawn from the points A and B, to the point of incidence C in the plane EG: for instance, they will be shorter than AD + DB, or any others.

For produce CB to F, and draw DF, because the vertical angles ECF and BCG are equal, the arch EF is equal to BG, equal to AE by the supposition; but it is plain, that  $FC = AC = CB$ ; wherefore  $FB (= AC + CB)$  is less than  $DF + DB = AD + DB$ : and so it will be in every case. Wherefore, since the ray must go the nearest way, the angle of incidence will always be equal to that of reflection: For the two angles ECA, and BCG, being thus equal, their compliments ACP and PCB must also be equal, and may be thus proved. Produce the ray AC directly till it meet with the perpendicular GH in H: then make GK equal GH, and produce CB to K: I say CK is the reflected ray, and that the angle PCK is equal to PCA: for PC being drawn perpendicular to the plane EG, the angle ECA + ACP are equal to the angles GCB + KCP; because they are both equal to a right angle. But ECA is equal to GCH, which is equal to GCK by construction; and therefore the angle of incidence, ACP, is equal to the angle of reflection, PCK. Q.E.D.

It is likewise demonstrated in optics, that the sines of the angles of incidence, and refraction, are to each other reciprocally as the resistances of the mediums. And Sir Isaac Newton, in his Optics, says, the sine of incidence is either accurately, or very nearly in a given ratio to the sine of refraction. And that the angles of reflection, and refraction, lie in one and the same plane with the angle of incidence. Whence, if that proportion be known in any inclination of the incident ray, 'tis known in all the inclinations, and thereby the refractions in

all cases of incidence on the same refracting body may be determined. Thus, if the refraction be made out of air into water, the sine of incidence of the red light is to the sine of its refraction as 4 to 3. If out of air into glass, the sines are as 17 to 11. In light of other colours, the sines have other proportions; but the difference is so little, that it need seldom be considered.

Suppose therefore, that RS. (*ibid.* n<sup>o</sup> 2.) represents the surface of stagnating water, and that C is the point of incidence in which any ray coming in the air from A in the line AC, is reflected or refracted, and I would know whether this ray shall go after reflection or refraction: I erect upon the surface of the water, from the point of incidence, the perpendicular CP, and produce it downwards to Q, and conclude from what has been said, that the ray after reflection and refraction, shall be found somewhere in the plane of the angle of incidence, ACP, produced. I let fall therefore, upon the perpendicular CP, the sine of incidence AD; and if the reflected ray be desired, I produce AD to B, so that DB be equal to AD, and draw CB. For this line CB shall be the reflected ray, the angle of reflection BCP, and its sine BD, being equal to the angle and sine of incidence. But if the refracted ray be desired, I produce AD to H, so that DH may be to AD as the sine of refraction to the sine of incidence, that is, (if the light be red) as 3 to 4; and about the center C, and in the plane ACP, with the radius CA, describing a circle ABE, I draw parallel to the perpendicular CPQ, the line HE cutting the circumference in E, and joining CE, this line CE shall be the line of the refracted ray. For if EF be let fall perpendicularly on the line PQ, this line EF shall be the sine of refraction of the ray CE, the angle of refraction being ECQ; and this line EF is equal to DH, and consequently in proportion to the sine of incidence AD as 3 to 4.

INCIDENT, in law, something that inseparably belongs to another: thus, a court baron is incident to a manor.

INCIDENT, in poetry, denotes much the same with episode. See EPISODE.

INCISIVE, an appellation given to whatever cuts or divides: thus, the fore-teeth are called dentes incisivi, or cutters; and medicines of an attenuating nature, incidents, or incisive medicines. See the articles TEETH and ATTENUANTS.



Fig. 1. ICOSA HEDRON.

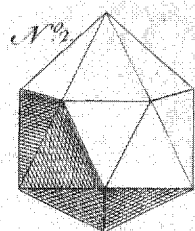
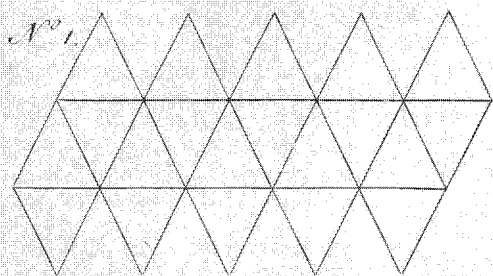


Fig. 2. INCIDENCE.

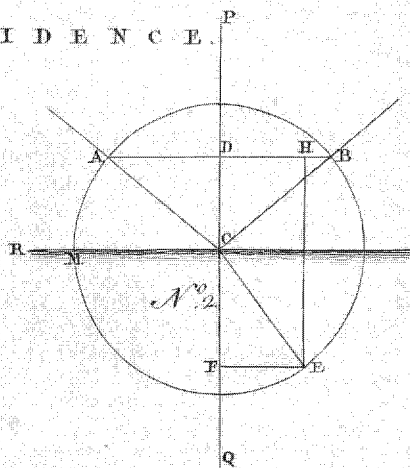
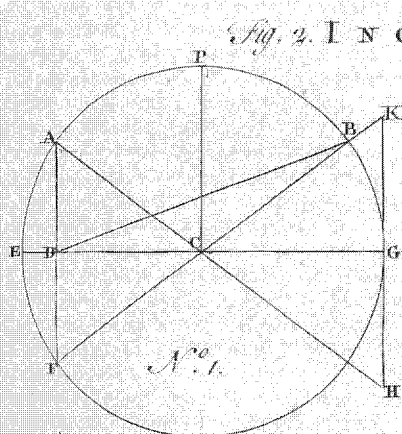


Fig. 3. INCLINATION.

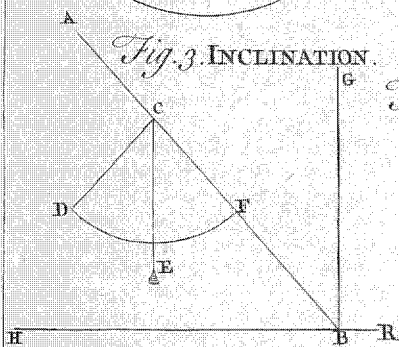


Fig. 5. IRIS, the *FLOWER DE LUCE*.

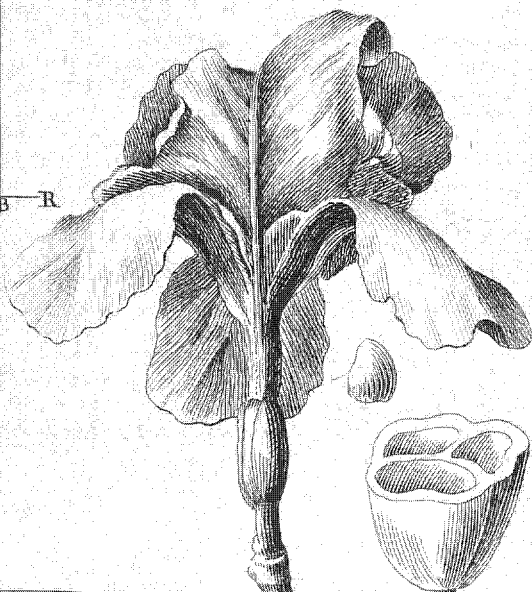


Fig. 4 IPOMÆA.





**INCLE**, a kind of tape made of linnen-yarn, which on importation pays for every dozen pounds, a duty of 1l. 5s. 8  $\frac{8}{100}$  d. and draws back 1l. 1s. 11  $\frac{2}{100}$  d. on exportation; for the dozen pieces in rolls, containing thirty-six yards each, 19s. 3  $\frac{6}{100}$  d. and draws back 16s. 5  $\frac{4}{100}$  d. and for every pound weight of whitened or bleached linnen-yarn, known by the name of unwrought incle, or short spinnel, 3d.

**INCLINATION**, is a word frequently used by mathematicians, and signifies the mutual approach, tendency or leaning of two lines, or two planes towards each other, so as to make an angle.

Inclination of a right line to a plane, is the acute angle, which that line makes with another right line drawn in the plane through the point where the inclined line intersects it, and through the point where it is also cut by a perpendicular drawn from any point of the inclined plane.

Inclination of the axis of the earth, is the angle which it makes with the plane of the ecliptic; or the angle, contained between the planes of the equator and ecliptic.

Inclination of a planet, is an arch of the circle of inclination, comprehended between the ecliptic and the plane of a planet in its orbit.

The greatest inclination of saturn, according to Kepler, is  $2^{\circ} 32'$ ; of jupiter,  $1^{\circ} 20'$ ; of mars,  $1^{\circ} 50' 30''$ ; of venus,  $3^{\circ} 22'$ ; of mercury,  $6^{\circ} 54'$ . According to de la Hire, the greatest inclination of saturn is  $2^{\circ} 33' 30''$ ; of jupiter,  $1^{\circ} 19' 20''$ ; of mars,  $1^{\circ} 51' 00''$ ; of venus,  $3^{\circ} 25' 5''$ ; of mercury,  $6^{\circ} 52' 00''$ .

Inclination of a plane, in dialling, is the arch of a vertical circle, perpendicular both to the plane, and the horizon, and intercepted between them. To find this, Let AB (plate CXLIV. fig. 3.) be a plane inclined to the horizon HR; apply to the plane AB a quadrant DCF, so as the plummet CE may cut off any number of degrees on the limb as EF: I lay the arch DE is the measure of the angle of inclination ABH; for draw BG perpendicular to HR, then because CE is parallel to BG, the angle ECF is equal to CBG; but DCF is equal to GBH, being both right angles, therefore the angle DCF—ECF, is equal to the angle GBH—CBG; that is, DCE is equal ABH.Q.E.D.

**INCLINED PLANE**, in mechanics, one

that makes an oblique angle with the horizon.

If a force, with a given direction, supports a height upon an inclined plane; that force is to the weight, as the sine of the inclination of the plane to the sine of the angle which is made by the line in which the force acts, and the line perpendicular to the plane. Thus, let AB (plate CXLV. fig. 1. n<sup>o</sup> 1.) be the inclined plane, P the weight supported, and DPV the direction of the force which supports the weight. Let PC be drawn perpendicular to AB; and from the point C, let CB be drawn parallel to the horizon, and perpendicular to the common section of the plane and the horizon, meeting the plane in B; and CA perpendicular to the horizon and also to CB, meeting the plane in A, and the line in which the force acts in V.

Now P may be conceived to be held unmoved by three forces acting together, one of which is the force of the weight itself tending downwards in a line parallel to VC, viz. PH; the second is the force acting in the line DPV, and the third is the resistance of the plane itself, acting in the line CP, perpendicular to the plane: but these three forces are to each other as the sides of the triangle VPC, as will be evident by drawing a line thro' P parallel to VC, and completing the parallelogram H $\nu$ . The force, therefore, is to the weight which it sustains, as PV to VC; that is, as the sine of the angle VCP, or ABC, to the sine of the angle CPV, or CPD. Q.E.D. Therefore the force by which any heavy body would descend on any inclined plane, to the force of the descent on the perpendicular, is as the sine of the angle of the plane's inclination to the radius. For practice therefore, let the weight of any body be W, and P the power wanted to sustain it on an inclined plane. I say, by this theorem. R : W :: sine incli. : P. The three first of which are given, wherefore the fourth is found by trigonometrical calculation, thus. Let a body weigh 9999 pounds; what power will sustain it from descending on a plane inclined to the horizon with an angle of 34 degrees? Answer, 5592 pounds. See the work.

Weight 9999. 3.999957

S. L. incl. =  $34^{\circ} 9.747562$

13.747519

Radius 10.000000

5592 =  $3.747519$  = the power

If the points V and A coincide, that is, if the force acts according to the direction BA, the angle CPD, will be a right angle; and therefore, in that case, the force is to the weight as the sine of the inclination of the plane to the radius, or as the height AC to its length AB. And in this case, the force which is required to support a given weight is least of all; because the proportion of the sine of the inclination of the plane to the radius, is less than its proportion to any other sine whatever. If the point V falls above A; the greater the angle APV is, so much the more force is necessary to support the given weight upon the plane AB. Infomuch, that by increasing the angle APV, the proportion of the sine of the angle ABC, to the sine of the angle CPD, is also increased, till PV, AV, becoming parallel, and the angles VCP, CPD for that reason equal, the force and the weight will also become equal. So likewise if the point V falls below A, as at v, the force required to support the given weight, is again increased; the angle APv being increased, till P $\omega$ , vC become equal, and then the force and the weight will become equal again. Further, when the lines P $\omega$ , PC coincide, and the angle vPC by that means vanishes, the sine of the angle ABC will bear an infinite proportion to the sine of that; that is, no finite force whatsoever, acting in a line perpendicular to the plane, will be able to support the weight upon the plane. If the line in which the force acts be parallel to the base of the plane, the weight is to the force which supports it, as BC to CA, or as the base of the plane to the height of it. If from the point P, (*ibid.* n<sup>o</sup> 2.) PF be let fall perpendicular to BC; and from the point C, CG perpendicular to VP; it will easily appear, that PV is to VC (that is, the force is to the weight) as CF to CG. Wherefore the force and the weight will then support one another upon an inclined plane, when they are to each other reciprocally as perpendiculars drawn from the point C to the lines in which they act; (or, if GCF be looked upon as an angular ballance moveable about the center C) reciprocally as the velocities of the Points G and F reckoned upon the lines in which the forces act. If it should be required to lift up a very heavy body, as W or w (*ibid.* n<sup>o</sup> 3.) the height CB, it would be impracticable to raise it up in the line CB without a power

whose intensity is equal to that of the weight; and even in that case very inconvenient to do it, especially in building. But if an inclined plane AB be laid arising from the horizontal line AC, from whence the weight is to be raised, a less power than the weight will serve for that purpose, unless it pushes the body directly against the plane (as in the direction WT) or draws the body away from the plane (as from W towards e, t, or L) or in any direction on that side of the line Ee.

The direction in which the body can most easily be drawn or pushed up the plane is the line W $\omega$  M, parallel to the plane, and passing thro' the center of the weight; for whether the power divides a plane  $\angle$  K (in a direction perpendicular to it) along the line WM, or the power P (by its descent to p) draws it in the same line, the velocity of the power will be equal to the line W $\omega$ , the space described by the center of gravity of the weight, whilst the same weight rises only the perpendicular height ZB (= nW) or has the said line properly to express its velocity. If the body was a cylinder, as a rolling stone, and the plane Tt were to pass thro' the gudgeons or axis of the said stone, it is evident that the case would be same; and as the weight P has its rope running over the roller (or upper pulley) M, the line Pp will be the velocity of the power. Therefore in this case the weight (if kept in æquilibrium) will be to the power as W $\omega$  (=TB) to wY (=BZ) or as the hypothenuse AB is to the perpendicular BC, which (by Eucl. 4. 6.) are in the same proportion; and consequently, if the power be never so little increased, it will draw the weight up the plane.

That the power acts with the greatest advantage, whilst it draws in the line of direction W $\omega$  (parallel to the plane) is evident, because if, one end of the said plane of direction remaining fixed at W, the other should move towards B, or beyond it, then the body would be partly drawn against the plane, and therefore the power must be increased in proportion to the greatest difficulty of traction: And if the end w of the line above-mentioned should be carried to D, or beyond it, the power must be also increased, inasmuch as it endeavours to lift the body off from the plane.

If the power draws in a line of direction WB (*ibid.*) parallel to the base of the plane;

*Fig. 1.* INCLINED PLANE.

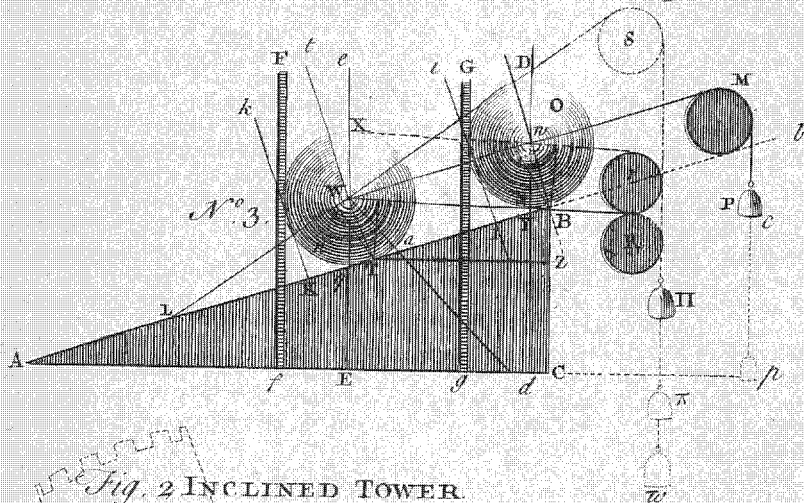
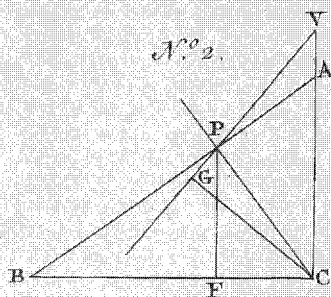
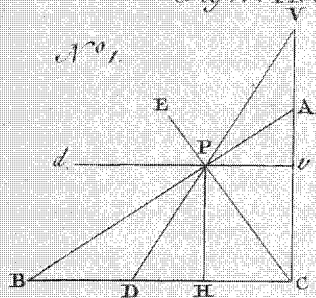
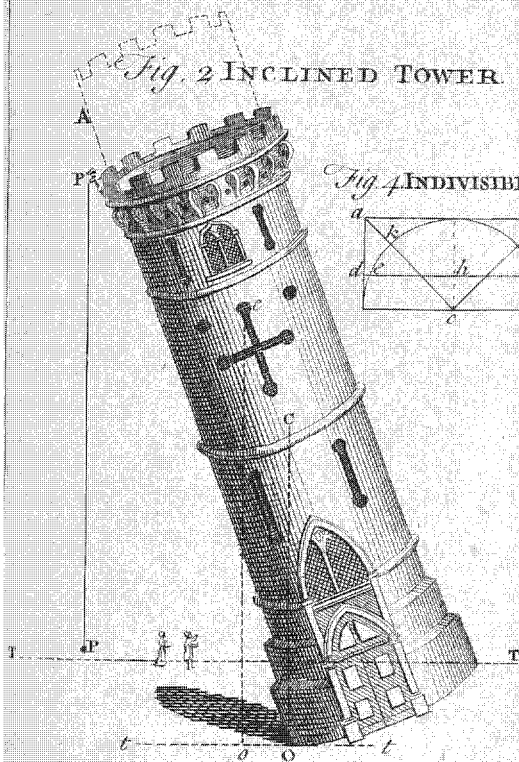


Fig. 2 INCLINED TOWER.



*Fig. 4* INDIVISIBLES

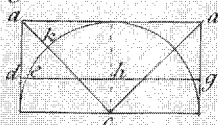


Fig. 3.  
INDENTED

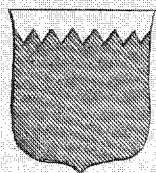
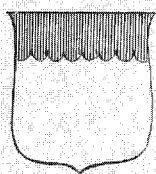


Fig. 5.  
INVESTED





plane; then, in order to keep the weight  $W$  in æquilibrium by the power  $\pi$ , the said power must be to the weight, as  $ZB$  to  $ZT$ , or as the perpendicular  $BC$  to the base  $AC$  of the triangle  $ACB$ . For if we suppose the pulley  $R$  at so great a distance from  $W$ , that the line of direction  $WR$  may not sensibly alter its horizontal position, whilst the body  $W$  rises the height  $BZ$ , in such manner that  $\pi \pi (=WY$ , and not  $Ww)$  will be the velocity of the power. So that the velocity of the power to that of the weight will not be as the hypothenuse to the perpendicular, as in the former case, but as the base to the perpendicular in the triangle  $ACB$ . If the powers be increased just enough to overcome the friction of the plane, and draw up the body  $W$ , let the pulley  $R$  be lifted up gradually to  $r$ , so as to keep the line  $WR$  parallel to itself till it comes to  $wr$ , and the power will be descended to  $\pi$ , when the weight is come to  $wB$ . But  $\pi \pi$ , together with the distance  $Rr$ , is equal to  $\pi w$ , or  $WY$ , &c. And this traction, being constantly made in the angle  $WBT$ , is the case. For the motion of the loaded cylinder upon an inclined plane, see **CYLINDER**.

**INCLINED TOWERS**; those whose tops hang so far over, as to appear dangerous to people walking below.

Such is that represented in plate **CXLV**. fig. 2. where  $PP$  is the perpendicular let fall from the top of the tower to  $TT$  the horizontal plane. Now the reason why such towers do not fall, is owing to their centers of gravity being supported: thus  $C$ , the center of gravity of the tower here represented, is supported by the perpendicular  $CO$ , so that it cannot fall; but had the tower been built higher to  $A$ , so as to transfer the center of gravity from  $C$  to  $c$ , the tower must have fallen, since the perpendicular  $co$  is not supported, as falling without the foundation of the tower.

**INCLINERS**, or **INCLINING DIALS**. See the article **DIAL**.

**INCLOSURE**, in husbandry, the fence or hedge made to inclose lands. See the articles **FENCE** and **HEDGE**.

A very good inclosure may be made of elder-sticks, or truncheons, cut ten or twelve feet long, and stuck into the bank slope-wise, so as to make a chequer-work. These make the speediest shelter of any; and when the trees are grown up, they are valuable for the turner's use. They succeed extremely well in

watery places; and when planted on the banks of rivers, they prevent them from being undermined by the current.

The throwing down inclosures is an offence punishable by our antient statutes; yet if the lord of a manor incloses part of the waste, and does not leave sufficient room for the commoners, they may break down such inclosure, or have a writ of assize.

**INCOGNITO**, or **INCOG**, is applied to a person that is in any place, where he would not be known: but it is more particularly applied to princes, or great men, who enter towns, or walk the streets without their ordinary train, or the usual marks of their distinction and quality.

**INCOMBUSTIBLE**, something that cannot be burnt, or consumed by fire.

Authors talk much of a combustible cloth, made of the asbestus. See **ASBESTUS**. In the Philosophical Transactions, n<sup>o</sup> 276, we have an account of an incom-bustible lint, which is a peculiar species of asbestus, or earth-flax, which is never formed into compact masses as the other species are, but is always found in loose filaments, very fit to be wrought into cloth. It is found only, so far as yet known, in the county of Aberdeen in Scotland. The antient Romans spun their asbestus into cloths, in which they wrapped up the dead bodies, before committing them to the funeral pile, in order to preserve their ashes distinct from those of the wood. What they had for this purpose, seems, by all accounts, to have been very short; but this species would be much more proper, as being seven or eight inches long.

**INCOMMENSURABLE**, a term in geometry, used where two lines, when compared to each other, have no common measure, how small soever, that will exactly measure them both. And in general, two quantities are said to be incommensurable, when no third quantity can be found that is an aliquot part of both.

Such are the diagonal and side of a square; for tho' each of those lines have infinite aliquot parts, as the half, the third, &c. yet not any part of the one, be it ever so little, can possibly measure the other, as is demonstrated in prop. 117. lib. x. of Euclid.

Rappus, lib. iv. prop. 17. speaks also of incommensurable angles. As to surfaces which cannot be measured by a common surface, they are said to be incommensurable in power.

**INCOMMENSURABLE NUMBERS** are such as have no common divisor, that will divide them both equally.

**INCOMPATIBLE**, that which cannot subsist with another, without destroying it: thus cold and heat are incompatible in the same subject, the strongest overcoming and expelling the weakest.

**INCORPORATION**, in pharmacy, is much the same as impastation, being a reduction of dry substances to the consistence of a paste, by the admixture of some fluid; thus pills, boles, troches, and plasters are made by incorporation. Another incorporation is, when things of different consistences, are by digestion reduced to one common consistence.

**INCORPOREAL**, a thing, or substance, which has no body; as God, angels, and the soul of man.

**INCORRUPTIBLE**, that which cannot be corrupted. See **CORRUPTION**.

**INCORRUPTIBLES**, or **INCORRUPTIBLES**, in church-history, heretics which had their original at Alexandria, in the time of the emperor Justinian. Their distinguishing tenet was, that the body of Jesus Christ was incorruptible from his conception, by which they meant that after and from the time he was formed in the womb of his holy mother, he was not susceptible of any change or alteration, not even of any natural and innocent passions, as hunger, thirst, &c. so that he eat without any occasion before his death, as well as after his resurrection.

**INCRASSATING**, in pharmacy, &c. the rendering fluids thicker by the mixture of other substances less fluid; or by the evaporation of the thinner parts.

Incrassating medicines are such as reduce the too fluid blood and juices to a proper consistence, and a due condensation.

**INCRUSTATION**, in surgery, the induction of a crust or eschar upon any part.

Among maçons, incrustation signifies the lining or coating of a wall, either with glossy stones, rustics, marble, pottery, or stucco-work, and that either equally or in panels and compartments.

**INCRUSTED**, or **INCRUSTATED COLUMN**, is a column consisting of several pieces, or slips of some precious marble massicated or cemented round a mould of brick, or other matter.

**INCUBATION**, the action of a hen, or other fowl brooding on her eggs.

**INCUBUS**, or **NIGHT MARE**, in medicine,

the name of a disease which consists in a spasmodic contraction of the muscles of the breast, usually happening in the night, and attended with a very painful difficulty of respiration and great anxiety. The most obvious symptom of this disease is a sensation like that of some great weight laid upon the breast: this is attended with so violent a prohibition of respiration, that the person becomes unable to move any part of his body, or to utter any distinct or articulate sound. This whole complaint goes off as soon as any one limb is moved, but there is oftentimes an universal lassitude of the whole body left behind it, which remains for some space of time.

This disease attacks people in the nighttime, in a sort of middle state, between sleeping and waking; and commonly, as Willis observes, when the stomach is oppressed with aliment of a hard digestion, especially if the patient lies on his back. Those of a plethoric habit are most subject to it; and among them, such particularly as have a great thickness of the blood; as also persons who are subject to hypochondriac complaints, and to disorders of the spleen.

Hence the causes of this disease are a stagnation of the blood in plethoric habits, where it is thick about the vena portæ, which nature is endeavouring to throw off by means of those spasmodic motions which constitute this disease, and very often crudities in the primæ viæ become additional causes, and exasperate the complaint. Physicians esteem this disease of no danger; but Junker thinks it is much to be suspected, that many of those people, who are found dead in their beds, perish by it.

When this distemper returns so often as to call for the advice of a physician, the method is to give gentle purges, three or four times, with the digestive medicines: such as gum ammoniacum, or the tartarum vitriolatum: on the intermediate days after this, bleeding in the foot is proper; and when this has been done, powders of nitre and cinnabar usually complete the cure. If they fail, the common method in hypochondriac cases is to be used. When there are crudities in the primæ viæ which exasperate this disease, then, after the purges, gentle bitters and other medicines are to be given, which will restore the tone of the stomach. Gentian-root and orange-peel in infusion, are very good for this purpose.

When



When it happens wholly from a load on the stomach, a gentle vomit alone will perform the cure. To prevent returns of this disease, the patient should eat light suppers, and must accustom himself to lie on one or the other side, never on the back, nor with his head very low.

Heister observes, that those who have troubled dreams, or walk in their sleep, are to be cured in the same manner, as proceeding from the same causes.

**INCUMBENT**, a clerk, or minister who is resident on his benefice: he is called incumbent, because he does, or at least ought, to bend his whole study to discharge the cure of his church.

**INCUMBRAVIT**, or **QUARE INCUMBRAVIT**, in law. See **QUARE**.

**INCURVATION** of the rays of light, their bending out of a rectilinear or straight course, occasioned by refraction. See the article **REFRACTION**.

**INCUS**, in anatomy, a bone of the internal ear, somewhat resembling one of the anterior dentes molares.

In the incus, we are chiefly to observe its body, its fovea, or hollow, serving for its articulation with the malleus, and its two crura, or legs; to the longer of which, there is joined another bone called the stapes. See **EAR**.

**INDECIMABLE**, something not chargeable with tithes. See **TITHES**.

**INDEFEISIBLE**, or **INDEFEAZABLE**, a term in law, for what cannot be defeated or made void; as an indefeisible estate of inheritance, &c.

**INDEFINITE**, or **INDETERMINATE**, that which has no certain bounds; or to which the human mind cannot affix any. Descartes makes use of this word in his philosophy instead of infinite, both in numbers and quantities, to signify an unconceivable number, or a number so great that an unit cannot be added to it; and a quantity so great as not to be capable of any addition. Thus, he says, the stars visible and invisible are in number indefinite; and not as the ancients held infinite; and that quantity may be divided into an indefinite number of parts, not an infinite number.

**INDEFINITE** is also used in the schools to signify a thing that has but one extreme; for instance, a line drawn from any point and extended infinitely. Thus what they call eternity *a parte ante*, or eternity, *a parte post*, are indefinite durations.

**INDEFINITE PROPOSITION**. See the article **PROPOSITION**.

**INDEFINITE**, in grammar, is understood of nouns, pronouns, verbs, participles, articles, &c. which are left in an uncertain indeterminate sense, and not fixed to any particular time, thing, or other circumstance.

**INDELIBLE**, something that cannot be cancelled, or effaced. Thus baptism and ordination, according to the church of Rome, are sacraments which convey indelible characters to the persons baptized and ordained.

**INDEMNIFY**, in law, the saving harms; or, a writing to secure one from all damage and danger that may ensue from any act. An indemnity in regard to estates, is called a warranty. See the article **WARRANTY**.

*Act of INDEMNITY*, the same with *act of grace*. See *Act of GRACE*.

**INDENTED**, in heraldry, is when the out-line of an ordinary is notched like the teeth of a saw. See plate **CXLV**. fig. 3.

**INDENTED LINE**, in fortification, the same with what the french engineers call redent; being a trench and parapet running out and in, like the teeth of a saw; and is much used in irregular fortification. See the article **FORTIFICATION**.

**INDENTED LEAF**, among botanists, is one notched round its verge. See **SERRATED**.

**INDEPENDENTS**, a sect of protestants in England and Holland, so called from their independency on other churches, and their maintaining that each church or congregation has sufficient power to act and perform every thing relating to religious government within itself, and is no way subject or accountable to other churches or their deputies.

They therefore disallow parochial and provincial subordination, and form all their congregations upon a scheme of co-ordinancy. But tho' they do not think it necessary to assemble synods; yet if any be held, they look on their resolutions, as prudential councils; but not as decisions, to which they are obliged to conform.

As to their service, they pray publicly for kings, and all in authority: they read and expound the scripture, and administer the sacraments of baptism and the Lord's Supper. Their public officers are pastors, teachers, ruling elders, and deacons. Their church censures lie all within the compass of admonition and excommunication.

The present independents differ from the  
to N  
presbyterians

presbyterians only in their church government, in being generally more attached to the doctrines distinguished by the term orthodoxy, such as original sin, election, reprobation, &c. and in administering the Lord's Supper at the close of the afternoon's service. See PRESBYTERIANS.

The several sects of baptists are all independents with respect to church government; and, like them, administer the Lord's Supper in the evening, whereas the presbyterians administer it after the forenoon's service. See ANABAPTISTS.

**INDETERMINATE**, in general, an appellation given to whatever is not certain, fixed, and limited; in which sense, it is the same with indefinite.

**INDETERMINATE PROBLEM**, in algebra, one which is capable of an indefinite number of solutions. See EQUATION.

**INDEX**, in anatomy, the same with the fore-finger. See FINGER.

**INDEX**, in arithmetic and algebra, shews to what power any quantity is involved, and is otherwise called exponent. See the article EXPONENT.

**INDEX of a logarithm**, that which shews of how many places the absolute number, belonging to a logarithm, doth consist; and of what nature it is, whether an integer or fraction. Thus, in this logarithm 2.523421, the number 2 standing on the left hand of the point is called the index; because it shews that the absolute number, answering to the above logarithm, consists of three places: for the number is always one more than the index.

If the absolute number be a fraction, then the index of the logarithm hath a negative sign, marked thus 2.523421. See the article LOGARITHM.

**INDEX of a globe**, the little style or gnomon, which being fixed on the pole of the globe, and turning round with it, points out the hours upon the hour circle. See the article GLOBE.

**Expurgatory INDEX**, a catalogue of prohibited books in the church of Rome.

The first catalogues of this kind were made by the inquisitors, and these were afterwards approved of by the council of Trent, after some alteration was made in them by way of retrenchment, or addition. Thus an index of heretical books being formed, it was confirmed by a bull of Clement VIII. in 1595, and printed with several introductory rules; by the fourth of which, the use of the scriptures in the vulgar tongue is forbidden to all

persons, without a particular licence; and by the tenth rule it is ordained, that no book shall be printed at Rome, without the approbation of the pope's vicar, or some person delegated by the pope; nor in any other places, unless allowed by the bishop of the diocese, or some person deputed by him, or by the inquisitor of heretical pravity.

The Trent index being thus published, Philip II. of Spain ordered another to be printed at Antwerp, in 1571, with considerable enlargements. Another index was published in Spain, in 1584, a copy of which was snatched out of the fire when the English plundered Cadiz. Afterwards there were several expurgatory indexes, printed at Rome and Naples, and particularly in Spain.

**INDIA PROPER**, or **HITHER INDIA**, a large peninsula in Asia, bounded on the north by Ubec Tartary, and Thibet; on the east, by another part of Thibet, the kingdom of Afem, Ava, and Pegu; on the south by the bay of Bengal, and the Indian ocean; and by the same ocean and Persia on the west: situated between  $66^{\circ}$  and  $92^{\circ}$  of east longitude, and between  $7^{\circ}$  and  $40^{\circ}$  of north latitude; being about 2000 miles in length from north to south, and 1500 miles in breadth from east to west, where broadest; tho' the southern part of the peninsula is not 300 miles broad. All the country within these limits is either subject or tributary to the great Mogul. It is frequently called *Indostan*, a name supposed to be derived from the river Indus, on its western frontiers: it is also called the *Mogulistan*, from the imperial family now upon the throne, who trace their pedigree from Tamerlane, a Mogul Tartar.

The produce of this country, and what the Europeans import from thence, is chiefly chints, calicoes, muslins, some silk, pepper, and diamonds, which are purchased by most nations with silver; but the Dutch frequently barter spices for them, which makes the India trade doubly advantageous to them.

**INDIA beyond the Ganges**, is a country bounded by Thibet and Boutan on the north; by China, Tonquin, and Cochinchina on the east; by the Indian Ocean on the south; and by the hither India, the bay of Bengal, and the Straits of Malacca on the west: it is situated between  $92^{\circ}$  and  $104^{\circ}$  of east longitude, and between the equator and  $30^{\circ}$  degrees of north latitude: being near 2000 miles

in length from north to south ; but of a very unequal breadth ; in which limits are comprehended the kingdoms of Afem, Ava, Pegu, Laos, Siam, Cambodia and Malacca, governed by as many indian princes ; only the Dutch have usurped the dominion of Malacca. In this country there are a vast number of elephants, and consequently a great deal of ivory ; our merchants also meet with gold and precious stones, canes, opium, and such other articles as are usually found within the tropics.

**INDIAN BERRY**, *coccus indicus*, in commerce, &c. See **COCCULUS**.

It is as little used in the shops, being esteemed poisonous. Fishermen have a way of mixing it in paste, which when eaten greedily by the fish, intoxicate them to such a degree as to make them for a time appear lifeless, and float upon the water ; and the good women use it, mixed with stavesacre, for destroying vermin in children's heads.

**INDIAN LEAF**, the leaf of a large and lofty tree, called malabathrum, which grows in Malabar, principally upon the mountains.

The antients have said much of the virtues of the malabathrum ; they call it stomachic, sudorific and cephalic. Dioscorides ascribes to it all the virtues of the indian spikenard, and says, that it possesses them in a superior degree: but at present it is utterly disregarded, and only kept in the shops as an ingredient in the theriaca, mithridate, and some other compositions.

**INDICATION**, in physic, whatever serves to direct the physician how to act.

There are four sorts of indications, 1. The prophylactic or preservative, which directs what is necessary to be done, in order to preserve health, and avert threatened diseases. 2. Curative, shewing how to remove diseases actually formed. 3. Palliative, or mitigatory, which relates to the mitigation of the symptoms, when too violent to be neglected till the termination of the disease. 4. Vital, which relates to the immediate preservation of life.

**INDICATIVE**, in grammar, the first mood, or manner, of conjugating a verb, by which we simply affirm, deny, or ask something ; as, *amant*, they love ; *non amant*, they do not love ; *amantne*, do they love ?

**INDICATIVE COLUMN**. See **COLUMN**.

**INDICAVIT**, in law, a writ or prohibition that lies for a patron of a church, whose clerk is sued in a spiritual court by another clerk for tythes, amounting to a fourth part of the profits of an advowson ; for then the suit belongs to the king's court.

This writ cannot be had before the defendant is libelled in the ecclesiastical court, a copy of which must be produced in the court of chancery, before the writ is granted ; and brought before judgment is given in the spiritual court, otherwise the indicative will be void.

**INDICTION**, in chronology, a cycle of fifteen years. See **CYCLE**.

The roman or papal indiction, which is that used in the pope's bulls, begins on the first of January ; and by it the popes have dated their acts ever since Charlemain made them sovereigns. But besides this, there are other two kinds of indiction mentioned by authors, *viz.* that of Constantinople, beginning on the first of September ; and the imperial or cesarian indiction, which commenced on the 14th of September.

**INDICTION** is also used for the convoking an ecclesiastical council or assemble. See the article **COUNCIL**.

**INDICTIVE FEAST DAYS**, *indictive ferie*, the same with those called conceptive. See the article **FERIÆ**.

**INDICTMENT**, in law, is a bill or declaration of complaint, at the suit of the king, drawn up in form of law, and exhibited against a person, and afterwards preferred to the grand jury or inquest, who are to find whether the complaint be true or not. An indictment differs from an accusation only in this, that the preferrer of the bill is not tied to the proof thereof, under any penalty, except there appear to be a conspiracy.

As indictments are purely for the good and quiet of the common-wealth, they are to be preferred for criminal, not civil matters. They are used in cases of high treason, and petit treason, felony, and trespasses of all kinds, and in all pleas of the crown ; though they cannot be used for injuries of a private nature, that neither concern the king nor the public : and therefore all indictments ought to be brought for offences committed against the common-law, or against statutes ; and not for every slight misdemeanor. A person cannot be indicted of suspicion of felony, but of the very crime itself ;

and then if he be not in custody, the sheriff is commanded to attach his body by a *capias*, &c. A person indicted for felony may have counsel allowed to speak for him, as to matter of law only: but such as are indicted for treason may have a copy of their indictment before trial, in order to advise with counsel; and such indictments are to be found within three years after the offence committed, unless the treason be directly against the king's person.

Indictments must be certain in every point, and charge some particular offence; also goods stolen must be particularly set down, and the offence laid positively, and not by way of recital. There must also be expressed the christian name, surname, and addition of the offender, with the day, year, and place in which the offence was committed, as also the nature of the offence. In an indictment for murder, the length, depth, or other dimension of the wound must be expressed, that a judgment may be formed whether it was mortal: and in felony, the value of the things stolen is to be particularly mentioned, in order that it may appear whether the offender has been guilty of grand or petit larceny. A mistake in spelling the defendant's surname is not a sufficient cause for abating the indictment, provided it sounds like it. If a word of consequence be omitted in an indictment, it renders the whole naught; but the case is not the same, where a word of form is omitted, or where there is an omission of a synonymous word, if the sense is not injured. In case one part of an indictment is inconsistent with another part of it, the indictment becomes void; tho' where the sense is plain, the court will dispense with a small inconsistency. Indictments are amendable the same term they are brought into court, but not afterwards; and in criminal prosecutions, the amendment must be only such as is permitted by the common law. Indictments for crimes committed, ought to be laid in the county where they were done; for otherwise, upon pleading the general issue, not guilty, if it appears that the offence was committed in another county or place different from that in the indictment, the defendant will be acquitted. An offender is subject to indictment, for a felony committed against a person unknown; yet some body must be proved to be the proprietor upon the trial, or else the property

will be presumed to be in the prisoner, he having pleaded not guilty. An indictment being at the king's suit, the prosecutor is a good witness to prove the charge contained in it; and no damage can be given to the party aggrieved, except it be particularly grounded on some statute. Indictments before justices of the peace may be removed by *certiorari* into the king's-bench.

INDIES, east and west. See INDIA and AMERICA.

INDIGESTION, in medicine, a crudity, or want of due coction, either in the food, an humour of the body, or an excrement. See CRUDITY and DIGESTION.

INDIGETES, a name which the antients gave to some of their gods.

There are various opinions about the signification of this word; some maintaining it was given to all the gods, in general; and others only to the semi-gods, or great men deified. Others say, it was given to such gods as were originally of the country, or rather such as were the gods of the country that bore this name. Others again, hold, that it was ascribed to such gods as were patrons and protectors of particular cities.

INDIGNATORIUS MUSCULUS, a muscle of the eye, otherwise called *abducens*, and *rectus exterior*: it has this appellation from its drawing the eye outwards, thereby occasioning the appearance of scorn. See the article EYE.

INDIGO, in commerce, a preparation of the juice of a plant, called by some anil, the characters of which are these: the cup is plane; the alæ of the flower are connivent at their upper edges, and are of the same figure with the vexillum. It is one of the *diadelphia decandria* class of Linnæus.

This plant grows to about two feet high, with roundish leaves; and is a native of both the East and West-Indies.

As to the indigo blue, it is a *fecula*, or settling, made by means of water and oil olive out of the leaves of the anil, or indigo plant: there is a difference between that made by the leaves only, and that which is made of the leaves and small branches. The choicest of the former sort is that which bears the surname of *Serquisse*, from a village of that name some leagues from Surat in the East-Indies. It is made also about Biana and Coffa near Agra; and also in the kingdom of Golconda. In making the *fecula* of anil, in order to make indigo

of it, they cut the herb with a sickle, when the leaves begin to fall upon touching them; and after they have stripped them from the branches, they put them into a sufficient quantity of water in a vessel called the steeping vat; and let them infuse there thirty or thirty-five hours; after which they turn the cock, in order to let the water run off, which is become of a green colour inclining towards blue, into a vessel of the nature of a churn, where it is worked by means of a roller or turner of wood, the ends of which are pointed and faced with iron: this they work till the water abounds with a lather; then they cast into it a little oil of olive, that is, one pound into such a quantity of the liquor, as will yield seventy pounds of indigo, such as is saleable; and as soon as the said oil is thrown in, the lather separates into two parts, so that you may observe a quantity curdled as milk is when ready to break: then they cease working, and let it stand to settle; which when it has done some time, they open the pipe or cock of the vessel, in order to let the water clear off, that the feculæ which is subsided may remain behind at the bottom of the vessel like the lees of wine. Then taking it out, they put it into straining bags of cloth, to separate what water was left: after which they convey it into chests or boxes that are shallow, to dry it; and being dried, it is what we call indigo.

Choose the indigo of Serquisse in flat cakes, of a moderate thickness, neither too soft nor too hard, of a deep violet colour, light, and such as swims on water; and when broken, has no white spots in it; and, lastly, such as is copperish or reddish on being rubbed with one's nail, and has the least dust and broken pieces in it.

The other sort of indigo is also the feculæ made from the anil, and differs nothing from the former, but as it is made of the whole plant, stalk and leaf; the best of which kind is that which bears the name Guatimala, that comes from the West Indies. In choosing this indigo, it should be as near the other kind as can be; but the surest proof of its goodness is its burning upon the fire like wax, and leaving only a little ashes behind. The second sort of indigo is that of St. Domingo, differing nothing from the Guatimala, only that it is not of so lively a colour; the third is the Jamaica indigo;

the fourth is that of the Leeward islands; all which are better or worse, according as they are more or less neat and pure.

The use of the indigo is for the dyer and landrasses, serving the last to put among their linnen. The painters use it to grind with white for painting in blue; for if it is used alone and neat, it turns black; ground with yellow, it makes a green: some confectioners and apothecaries preposterously use this to colour sugars, with which to make conserves and syrup of violets, by adding some orrice.

From and after the 25<sup>th</sup> of March 1749, all persons who shall import into Great Britain, from any of the british colonies in America, in vessels trading and manned as by law directed, any good and merchantable indigo, free from any false mixtures and fit for dyers use, being the product of the colony from whence the same was imported, shall be intitled to six-pence for every pound thereof, to be paid out of the customs upon demand by the collector of the port where the same is imported. If any person make entry of foreign-made indigo under the name of british plantation made, or shall mix any foreign indigo or any false mixture with that made in the british plantations, in order to claim the premium, he shall forfeit the said indigo; and in case of such mixture, the quantity so mixed, both foreign and british plantation made, and double the value thereof, shall be forfeited by the person making such mixture.

Indigo of Turkey, of the West Indies, or rich indigo, as also dust indigo, and that of the british plantations, pay no duty on importation, and consequently have no draw-back on exportation.

INDIRECT *modes of syllogisms*, in logic, are the five modes of the fourth figure, expressed by the barbarous words *baralipli*, *celantes*, *dabitis*, *fapesmo*, *frisesom*. See MODE and FIGURE.

It is the conversion of the conclusion which renders the modes indirect; for instance, a syllogism in *darii*, and another in *dabitis*, would be perfectly alike were it not for that conversion; the propositions having the same quantity and the same quality, and the middle term being the subject in the major and the attribute in the minor, in both; it remains then that to make a distinction, that which is the subject of the conclusion in *darii*, be the attribute in the conclusion

of *debitis*; and that which is the attribute in the first, the subject in the last.

DA- Every thing that promotes salvation is advantageous:

RI- There are afflictions which promote salvation:

I. Therefore, there are afflictions which are advantageous.

DA- Every thing that promotes salvation is advantageous:

BI- There are afflictions which promote salvation:

TIS. Therefore, some things promoting salvation are afflictions.

**INDIVIDUAL**, *individuum*, in logic, a particular being of any species, or that which cannot be divided into two or more beings equal or alike.

The usual division in logic is made into genera or genus's, those genera into species, and those species into individuals. See the articles **GENUS** and **SPECIES**.

The schoolmen make a four-fold distinction of individuals, *viz.*

*Individuum vagum*, that which, tho' it signifies but one thing, yet may be any of that kind: as when we say a man, a certain person, or one said so and so; tho' but one person is meant, yet that one person, for aught that appears to the contrary, may be any body.

*Individuum determinatum*, is when the thing is named and determined, as Plato, Socrates, mount Atlas: this is also called *individuum signatum*.

*Individuum demonstrativum*, is when some demonstrative pronoun is used in the expression, as this man, that woman. *Individuum ex hypothesi*, or by supposition, is when an universal name or term is restrained by the supposition to a particular thing; as when we say the son of Mary, instead of Christ; the writer of the trojan war, instead of Homer.

**INDIVISIBLE**, among metaphysicians. A thing is said to be indivisible absolute, absolutely indivisible, that is a simple being, and consists of no parts into which it may be divided. Thus God is indivisible in all respects, as is also the human mind, not having extension or other properties of body.

**INDIVISIBLE** *secundum quid est*, indivisible with respect to what it now is, a substance which, though it consists of parts into which it may be divided, yet never can be so divided as to remain the same: thus a measure or number is said to be indivisible, for if from a foot-line, for

example, any thing is deducted, it is no more a foot-line; and if from the number three any thing is subtracted, it is no longer the same number. See the next article.

**INDIVISIBLES**, in geometry, the elements or principles into which any body or figure may be ultimately resolved; which elements are supposed infinitely small: thus a line may be said to consist of points, a surface of parallel lines, and a solid of parallel and similar surfaces; and then, because each of these elements is supposed indivisible, if in any figure a line be drawn through the elements perpendicularly, the number of points in that line will be the same as the number of the elements; whence we may see that a parallelogram, prism, or cylinder, is resolvable into elements or indivisibles, all equal to each other, parallel and like to the base; a triangle into lines parallel to the base, but decreasing in arithmetical proportion, and so are the circles which constitute the parabolic conoid, and those which constitute, the plane of a circle, or surface of an isosceles-cone. See the article **INFINITESIMALS**.

A cylinder may be resolved into cylindrical curve surfaces, having all the same height, and continually decreasing inwards, as the circles of the base do-on which they insit.

The method of indivisibles is only the antient method of exhaustions, a little disguised and contracted. It is found of great use in shortening mathematical demonstrations, of which take the following instance in the famous proposition of Archimedes, *viz.* that a sphere is two thirds of a cylinder circumscribing it.

Suppose a cylinder, an hemisphere, and an inverted cone, (plate CXLV. fig. 4.) to have the same base and altitude, and to be cut by infinite planes all parallel to the base, of which *dg* is one. It is plain the square of *db* will be every where equal to the square of *kc* (the radius of the sphere) the square *bc* = *eb* square; and consequently, since circles are to one another as the squares of the radii, all the circles of the hemisphere will be equal to all those of the cylinder, deducting thence all those of the cone: wherefore the cylinder, deducting the cone, is equal to the hemisphere: but it is known, that the cone is one third of the cylinder, and consequently the sphere must be two thirds of it. Q. E. D.

INDORSE-

**INDORSEMENT**, in law, any thing written on the back of a deed, as a receipt for money received.

There is likewise an indorsement, by way of assignment, on bills of exchange and notes of hand; which is done, by writing a person's name on the back thereof. See the article **BILL**.

**INDRAPORE**, a dutch settlement on the west coast of Sumatra, in the East Indies.

**INDUCEMENT**, in law, signifies what may be alledged as a motive; and, in our law, it is used specially in several cases; as, there is an inducement to actions, to a traverse in pleading, and to an offence committed, &c. It has been held that a general indebitus is insufficient, where it is the ground of an action; but where it is only the inducement to it, as in consideration of forbearing a debt till a certain day, this being a collateral promise, is good without shewing how the debt became due. A person ought to induce his traverse, when he denies the title of another; for this reason, because he should not deny it, till he shews some colourable title in himself; and because, if the title traversed should be found naught, and no colour appear for him who traversed, in that case no judgment can be given.

**INDUCTION**, in law, is putting a clerk or clergyman in possession of a benefice or living to which he is collated, or presented. See **PRESENTATION**.

After the bishop has granted institution, which is a kind of approbation of the choice made of the person, he issues out his mandate to the archdeacon to induct him; who either does it personally, or commissions some other person to do it for him. This is analogous to livery and seisin in temporal estates, and puts the clergyman inducted into possession of the church, glebe-land, tythes, &c.

Induction is performed in the following manner: the clergyman commissioned takes the minister to be inducted by the hand, lays it upon the key of the church, the ring of the door, the latch of the church-gate, or on the church-wall, and pronounces these words, "By virtue of this commission, I induct you into the real and actual possession of the rectory of, &c. with all its appurtenances." Then he opens the church door, and puts the parson in possession, who commonly tolls a bell, to give notice to the people that he has taken possession of the church.

Induction may also be made by delivery of a clod or turf of the glebe.

**INDULGENCES**, in the romish church, are a remission of the punishment due to sins, granted by the church, and supposed to save the sinner from purgatory. Clement VI. in his decretal, which is generally received by the church of Rome, declares, that our Saviour has left an infinite treasure of merits, arising from his own sufferings, besides those of the blessed virgin and the saints; and that the pastors and guides of the church, and more especially the popes, who are the sovereign disposers of this treasure, have authority to apply it to the living, by virtue of the keys, and to the dead, by way of suffrage, to discharge them from their respective proportions of punishment, by taking just so much merit out of this general treasure, as they conceive the debt requires, and offering it to God.

The power of granting indulgences has been greatly abused in the church of Rome. It was one of the chief things which the council of Constance laid to the charge of John XXIII. in 1415, that he impowered his legates to absolve penitents from all sorts of crimes, upon the payment of sums proportionable to their guilt. Pope Leo X. in order to carry on the magnificent structure of St. Peter's at Rome, published indulgences, and a plenary remission to all such as should contribute money towards it. Finding the project take, he gave his sister, the princess of Cibo, the benefit of the indulgencies of Saxony, and the neighbouring parts, and farmed out those of other countries to the highest bidders, who, to make the best of their bargains, procured the ablest preachers to cry up the value of the ware. "Happy times for sinners! says a modern writer, their crimes were rated, and the remission of them set up by auction. The apostolic chancery taxed sins at a pretty reasonable rate. It cost but ninety livres, and a few ducats, for crimes which people on this side the Alps punished with death."

It was this great abuse of indulgences that contributed not a little to the first reformation of religion, in Germany, where Martin Luther began first to declaim against the preachers of indulgences, and afterwards against indulgences themselves: but since that time the popes have been more sparing in the exercise

of this power: however, they still carry on a great trade with them to the Indies, where they are purchased at two reals a piece, and sometimes more.

The pope likewise grants indulgences to persons at the point of death, that is, he grants them, by a brief, power to choose what confessor they please, who is authorized thereby to absolve them from all their sins in general.

**INDULT**, in the church of Rome, the power of presenting to benefices granted to certain persons by the pope. Of this kind is the indult of kings and sovereign princes, in the romish communion, and that of the parliament of Paris granted by several popes. By the concordat for the abolition of the pragmatic sanction, made between Francis I. and Leo X. in 1516, the french king has the power of nominating to bishoprics, and other consistorial benefices, within his realm. At the same time, by a particular bull, the pope granted him the privilege of nominating to the churches of Britany and Provence. In 1648, pope Alexander VIII. and in 1668, Clement IX. granted the king an indult for the bishoprics of Metz, Toul, and Verdun, which had been yielded to him by the treaty of Munster; and in 1668, the same pope Clement IX. granted him an indult for the benefices in the counties of Roussillon, Artois, and the Netherlands. The cardinals likewise have an indult granted them by agreement between pope Paul IV. and the sacred college in 1555, which is always confirmed by the popes at the time of their election. By this treaty the cardinals have the free disposal of all the benefices depending on them, and are empowered likewise to bestow a benefice in commendam.

**INDULTO**, a duty, tax, or custom paid to the king of Spain, for all such commodities as are imported from the West Indies in the galleons. See **GALLEONS**.

**INDUS**, a large river of Asia, which rises in the mountains which separate Tartary from India, and discharges itself into the Indian ocean.

**INERTIA of matter**, in philosophy, is defined by Sir Isaac Newton to be a passive principle by which bodies persist in their motion or rest, receive motion in proportion to the force impressing it, and resist as much as they are resisted. It is also defined by the same author to be a power implanted in all matter, whereby

it resists any change endeavoured to be made in its state.

This power then coincides with the vis resistendi, or power of resisting, whereby every body endeavours, as much as it can, to persevere in its own state, whether of rest or uniform rectilinear motion; which power is still proportionable to the quantity of matter in any body: for since natural bodies consist of a mass of matter, that, of itself, is not able to induce any change in its state, if bodies were once at rest, it is necessary that they should always remain in that state of rest, unless there is applied a new force to produce motion in them: but if they were in motion, the same energy or force would always preserve the motion; and therefore bodies would always retain their motion, and would always proceed forward in the same right line with the same tenour, since they cannot of themselves acquire either rest or a retardation, or a change of their direction to turn on one side or the other.

There are some philosophers who readily enough acknowledge, that no body can move of itself, that is, pass from rest to motion of itself; but then they are not as willing to grant, that bodies once moved cannot of themselves arrive at rest, by reason they see the motions of projectiles languish by degrees, and at last the moving bodies themselves come to rest. See **PROJECTILES**.

But as no mode or accident can of its own accord, or by itself, be destroyed, and as all effects produced by transient causes do remain always, unless there be some new and extraneous cause that destroys them; so likewise motion once commenced, will be continued always, unless it be hindered by some external cause: nor is it more in the power of a body once moved, to lay aside its motion or energy to move, and return of itself to rest, than it can put off the figure that it has been once formed into, and acquire a new one, without some extrinsic cause. Therefore, as there is in all bodies a certain force, or rather inactivity, whereby they oppose every change; from which cause it proceeds, that they are very difficultly put out of their state, whatever it is: but that inactivity is the same in moving bodies as in those at rest, nor do bodies less resist the action, whereby they are brought from motion



to rest, than that whereby they pass from rest to motion; that is, there is not required a less force to put a stop to the motion of any body, than was before necessary to impress that motion on the same body. Whence since the vis inertiae, or inactivity of matter, always equally resists equal changes, it will not be less powerful to continue a body in motion, which has begun to move, than to preserve a quiescent body in the same state of rest.

There are some philosophers who suppose body of its own nature to be as indifferent to motion as to rest; but by this indifference they do not, we suppose, mean such a disposition in bodies, whereby they do not in the least resist rest or motion: for on this supposition it would follow, that any body, however great, and moved with the swiftest velocity, might be stopped by any the smallest force; or if the great body was at rest, it might be moved by any body, however small, without the least loss of velocity in the impelling body: that is, any small body impinging on a greater one, would carry that greater body along with it, without the least loss of its motion; and each body after the impulse, would be jointly carried along with that celerity that the small body had at first, which we all know is absurd. This indifference, therefore, is not placed in a non-resistance to motion from a state of rest, or to rest from a state of motion; but in this only, that a body of its own nature is not more propense to motion than to rest, nor more resists to pass from a state of rest to motion, than to return again from that motion to the same state of rest: besides, any quiescent body may be moved by any force; and an equal force, acting in a contrary direction, will be able to destroy that motion; and in this, this indifference consists.

Since, according to this law, a body once in motion always continues in that motion, the philosophers ask, Why all projectiles lose by degrees their motion? Why do they not proceed in infinitum? If motion did not of its own nature decay, a stone thrown at the beginning of the world, would by this time have gone through an immense and almost infinite space. And so indeed it would, if its motion had been in vacuo, or in free spaces, and without any gravity. But since all projectiles are carried either thro' the air, or on the rough surfaces of other

bodies, they must be necessarily retarded: for since all bodies in motion must drive and thrust out of its place the resisting air, or overcome the roughness of the superficies upon which they are moved, they will lose all that force and motion that is constantly employed in overcoming these obstacles, and consequently the motion of projectiles will be continually diminished: but if there was no resistance in the medium, no roughness in the superficies on which they were moved, no gravity that continually forces the bodies towards the earth, motion would always continue the same, without any retardation at all. So in the heavens, where the medium is exceedingly rare, the planets do continue their motions for a very long time; and upon ice, or any other very smooth surface without any roughness, heavy bodies in motion are not soon brought to rest.

**INFALLIBLE**, something that cannot err, or be deceived. See **ERROR**.

One of the great controversies between the protestants and papists, is the infallibility which the latter attribute to the pope; though, in fact, they themselves are not agreed on that head, some placing this pretended infallibility in the pope and a general council. See the articles **COUNCIL** and **POPE**.

**INFAMY**, in law, is a term which extends to forgery, perjury, gross cheats, &c. by which a person is rendered incapable of being a witness or juror, even tho' he is pardoned for his crimes. See the articles **FORGERY**, **PERJURY**, &c.

**INFANT**, *infans*, in medicine, denotes a young child. See the articles **CHILD** and **DELIVERY**.

It being a matter of great importance how tender infants are treated, we shall lay down some rules for the direction of the diet, regimen, and other non-naturals, as well with regard to the infant as the nurse.

As soon, therefore, as the child is brought into the world, it ought, immediately after the ligature and cutting off the umbilical vessels, to be washed in a warm bath, prepared of water alone, or a mixture of wine and water. The midwife too should be allowed a convenient place and time to examine the child, and set to rights any parts that may be ill-formed by the birth. She should likewise stroke the belly with the hollow of her hand, in order to excite a discharge of the feces. If the new-born infant is

found to be weakly, it should be refreshed by washing it with warm wine, rubbing it gently, anointing the breast, back, and crown of the head with some analeptic spirits; or by breathing strongly into its mouth, after chewing cloves and other aromatics; or giving it a small quantity of rhenish wine, or cinnamon-water. Great caution is also necessary in swaddling the infant, lest out of negligence or ignorance, it receive any injury by this means: for besides that infants frequently become hump-backed from too great a stricture of the breast by bandage, by thus obstructing the circulation, they fall into a consumption, and are subject to ruptures and many other disorders.

The next care is, that infants, who for want of a discharge by stool in the mother's womb, always come into the world with their intestines replete with excrements, be seasonably purged. But in case the weak nature of the infant should not be sufficient of itself, providence has kindly furnished the mother at first with thin serous milk, whose detarging and diluting quality opens the body much better and with greater safety than the most select evacuants, and no danger is to be dreaded from it, unless that milky liquor flows from an impure spring; or the mother, from the difficulty of the birth, be agitated by convulsive motions; or unless any other circumstances concur which forbid the use of a medicine elaborated by nature in the breasts of women: in which case, if the infant has not a stool within twenty four hours, it may be proper to give it a very small quantity of solutive syrup of roses, or a clyster of whey and honey.

As to a proper diet, milk deservedly constitutes the principal, and the universal aliment; because it supplies both meat and drink at the same time, is grateful to the stomach, and for this purpose it was wisely ordered by the Creator, that women, immediately after their delivery, should accumulate a sufficient quantity of it in their breasts. As infants are nourished by the breasts either of the mother or a hired nurse, it is certainly the duty of parents, and those entrusted with the health of children, to take care that they generate pure and temperate milk. This is best obtained by their observing an exact method of diet, and avoiding all those

things which communicate any taste to the milk, even imperceptible to the senses, and especially such as are capable of producing distempers. Particularly let the nurse, if there be a necessity for one, be healthy, in the flower of her age, from twenty to thirty, rather lean than fat, of good morals, composed in mind, neither melancholy, passionate, nor a drunkard; nor let her milk be too stale; but her diet be regular, and great care must be taken that she does not all at once pass from a hard and sparing diet, to one that is delicate and plentiful. But nothing less than an absolute necessity should prevail on a mother to suffer her tender progeny to be delivered up to a mercenary nurse; since this is a barbarity exceeding every thing to be met with in the brute creation: for not only all the disorders incident to the body, but even those of the mind itself, are communicated to the sucking child.

It often happens that the milk is corrupted by various sudden causes, by which either the mother or the nurse may be affected: and here precautions are necessary to prevent impending danger: the milk is extremely vitiated by the terror of the woman who gives suck; and consequently the best preservative against the injury arising from it, is not to give the breast immediately after a fright. The same holds true with respect to anger; and since the injury done to the milk by violent passions, upon its long continuance in the breasts, endangers both the child and the nurse, to prevent this, the milk should be seasonably extracted.

It sometimes happens that either the infant is incapable of sucking the milk out of the breasts, or the nurse, from illness, or some other cause, is incapable of affording it: In this case, other proper aliments are to be provided, among which are sweet whey, barley-broth, water-gruel, emulsions of almonds, barley boiled to the consistence of a pulp, with the addition of the yolk of an egg; several kinds of pap, made of flour, or crums of bread boiled in water, given with or without milk: but chewing victuals and giving it to a child, ought by no means to be allowed; because by such mastication, not only the most subtle part of the pap is sucked out, but any infection of the saliva and corrupted teeth are easily communicated to infants. When children arrive at such an habit

as to be capable of digesting other aliments, care should be taken not to give them food of a hard consistence; they ought not to eat salt meat in great quantities, unripe fruit, bread not duly fermented, or too new; nor ought they to eat much of any kind of sweet meats.

As to the prevention of the diseases in infants, nothing is more useful both for the nurse and the child, than infusions of such herbs as sweeten the blood, made in water: and here an infusion of betony, root of liquorice, fennel-seed, and the like, are highly proper. Nor do they act amiss who sometimes, after a meal, eat a quantity of fennel or annise-seed, which increases the milk, and prevents gripes in the infant.

Since milk stagnating in the stomach and duodenum soon grows acid and coagulated, and thus excites a thousand dangerous symptoms, the greatest care ought to be taken to prevent what is attended with such dangerous consequences; for which purpose those powders are extremely efficacious which contain crabs-eyes, egg-shells, the root of florentine orris, saffron, the seeds or oil of annise, &c. of which a dose may be given twice or three times a week. And since the health of infants greatly depends upon a due and sufficient discharge of the excrements by stool, and the preservation of the tone of the stomach and intestines, gentle laxatives, if necessary, should be sometimes interposed; but strong and acrid purges, as resin of jalap, scammony, black heliobore, and the like, are improper and pernicious. They ought not to take aloes on account of the heat it occasions, nor the leaves of senna because of the costiveness it produces: nor are these prejudicial only when given to children, but also when given to the nurses; for being mixed with the milk, they often throw the tender infants into convulsions. Sydenham rightly observes, that children, in the first month, are often seized with the epilepsy from too frequent stools; and Galen justly asserted, that the bodies of children ought not to be excicated with purgatives, which would prevent their growing. And, really, it is inexpressible how much the tender and weak stomachs of new born infants are prejudiced by purgatives.

*Diseases of INFANTS* may be reduced to the following heads. 1. Retention of the meconium, or first stools, already taken notice of. 2. Aphthæ, or thrush, which

affect the whole mouth, and even intestines: for this Heister advises a grain or two of mercurius dulcis, given in two drams of solutive syrup of roses: he would have the nurse, likewise, take rhubarb, and the absorbent powders; and externally, Shaw would have the ulcers touched frequently with a mixture of honey of roses, and oil of vitriol. 3. Chaffing, or galling, of the flesh, already treated of under the article EXCORIATION.

4. Costiveness, for which Heister recommends two or three grains of rhubarb in solutive syrup of roses, or a solution of manna, till the child's belly is opened; and afterwards the testaceous powders. 5. Coughs of infants seldom prove obstinate, usually giving way to pectoral syrups, or a little spermaceti; relaxing the bowels at the same time with rhubarb, given in solutive syrup of roses. In very bad cases, a few drops of spirit of sal-armoniac, given pretty often, has a very good effect; and if the child be almost choked, a quarter of a grain of tartar emetic, taken as a vomit, will snatch it from the jaws of death. Oil of sweet almonds is likewise very good; as are flowers of sulphur, in phlegmatic habits. 6. Crusta Lactea, or scabby eruptions, otherwise called achores, already treated of under the articles ACHOR and CRUSTA. 7. Atrophy, or consumption, for the cure of which, the crudities of the bowels should be evacuated by gentle laxatives, now and then repeated, to which a few grains of mercurius dulcis must always be added; or even the purgative salts may be prescribed. Externally, baths of soft-water, with aromatic herbs, with friction of the joints while in the bath, and frequent motion, are recommended. 8. Convulsion, if owing to acrimonious humours in the bowels, is cured by gentle doses of syrup of rhubarb, with the absorbent powders; but when epileptic, cinnabar is to be given freely in powders; and when owing to worms, mercurius dulcis is the best of all medicines. 9. Diarrhœa of infants is already treated of under its proper article. 10. Stoppage of the nose sometimes happens, inasmuch that they can scarce breathe, suck, or swallow; for the cure of which, after a suitable purge, dissolve two or three grains of white vitriol in half an ounce of marjoram-water; then filtre it, and apply it now and then to the nostrils with a linen-rag. Or you may apply oil of sweet almonds, impregnated with oil of mar-

poram, to the bottom and sides of the nostrils, which will resolve the filth. 11. Running of the eyes and ears is a very common complaint, which is cured by small doses of the decoction of pimpernel-root, saffras, and gentle laxatives, in which a grain or two of calomel is mixed. 12. Vomiting is rather accounted salutary than otherwise; but when too violent, it may be remedied by gentle clysters. 13. Suppression of urine is cured by giving half a scruple of some neutral salt, as vitriolated tartar, arcanum duplicatum, and the like; but if these fail, a catheter must be introduced into the bladder, which is much easier in girls than boys. 14. Fevers of children, see FEVER. 15. Difficulty of teething, see DENTITION. 16. Imperforations of the necessary parts, so that there is no passage for the stools or urine; in which the assistance of the surgeon must be speedily called in, or the infant is lost. 17. Jaundice, or a yellowness of the skin, see JAUNDICE. 18. Worms in children, see WORMS. 19. Rickets seldom attack children before they are nine months old, see RICKETS. 20. Gripes, and other disorders of the bowels, are generally owing to corrupted milk; the cure of which consists in the use of antacids, mild cathartics, and clysters of the same intention, with gentle carminatives. Sometimes, indeed, the gripes are so violent as not to be cured without two drops of the thebaic tincture in a little syrup of roses. Absorbents are also deemed excellent in these disorders, as they cure the gripes, restlessness, and watching in infants, as certainly as opium eases pain in adults.

*Hare-Lip* in INFANTS. See LIP.

INFANT, in law, signifies a person under the age of one and twenty.

An infant may bind himself apprentice, and if he serve seven years, may have the benefit of his trade; but if he be guilty of misbehaviour, the master may give him gentle correction, or complain to a justice of peace and have him punished. He may also bind himself for the payment of necessities, such as meat, drink, washing, apparel and learning, though not by bond with a penalty: infants are not obliged to pay for cloaths, unless it be proved that they were for their own wearing, and convenient and necessary for them to wear according to their degree and estate; and though an infant may buy necessities, he cannot borrow

money to do it; for the law will not trust him with money, except at the peril of the lender, who must either see it thus laid out, or take care to lay it out himself in such necessities. If an infant is the defendant in an action, the plaintiff has six years to commence his action in after the infant comes of age; and an infant who is a plaintiff, has also six years, after he comes of age, to sue, by the statute of limitations. If an infant grants leases for a term of years, he may, at his full age, either confirm the lease, or bring trespass against the lessee for the occupation. Also a lease granted to an infant may be avoided by waving the land before the rent day expressed therein. An infant may purchase lands, where such purchase is intended for his benefit, though at his full age he may either avoid or confirm such purchase; and, in case an infant sell lands by deeds indented and enrolled, he may avoid the same. However, infants are bound by all acts of necessity, as in presentations to benefices, admittances and grants of copyhold estates, assenting to legacies, and conditions annexed to lands, whether an estate comes by grant or by descent.

INFANTE and INFANTA, all the sons and daughters of the kings of Spain and Portugal, except the eldest; the princes being called *infantes*, and the princesses *infantas*.

INFANTRY, in military affairs, denotes the whole body of foot-soldiers. See the articles FOOT and SOLDIERS.

INFECTION, among physicians, the same with contagion. See CONTAGION.

INFERNAL-STONE, *lapis infernalis*. See the article LAPIS.

INFINITE, that which has neither beginning nor end: in which sense God alone is infinite. See the article GOD.

Infinite is also used to signify that which has had a beginning, but will have no end, as angels and human souls. This makes what the schoolmen call *infinitum a parte post*; as, on the contrary, by *infinitum a parte ante*, they mean that which has an end but had no beginning.

INFINITE, or INFINITELY GREAT LINE, in geometry, denotes only an indefinite or indeterminate line, to which no certain bounds, or limits, are prescribed.

INFINITE QUANTITIES. The very idea of magnitudes infinitely great, or such as exceed any assignable quantities, does include a negation of limits: yet if we nearly examine this notion, we shall find that

that such magnitudes are not equal among themselves, but that there are really besides infinite length and infinite area, three several sorts of infinite solidity; all of which are *quantitates sui generis*, and that those of each species are in given proportions.

Infinite length, or a line infinitely long, is to be considered either as beginning at a point, and so infinitely extended one way, or else both ways from the same point; in which case the one, which is a beginning infinity, is the one half of the whole, which is the sum of the beginning and ceasing infinity; or, as may be said, of infinity *a parte ante* and *a parte post*, which is analogous to eternity in time and duration, in which there is always as much to follow as is past, from any point or moment of time: nor doth the addition or subtraction of finite length, or space of time, alter the case either in infinity or eternity, since both the one or the other cannot be any part of the whole.

As to infinite surface, or area, any right line, infinitely extended both ways on an infinite plane, does divide that infinite plane into equal parts, the one to the right, and the other to the left of the said line; but if from any point, in such a plane, two right lines be infinitely extended, so as to make an angle, the infinite area, intercepted between those infinite right lines, is to the whole infinite plane as the arch of a circle, on the point of concurrence of those lines as a center, intercepted between the said lines, is to the circumference of the circle; or, as the degrees of the angle to the 360 degrees of a circle: for example, right lines meeting at a right angle do include, on an infinite plane, a quarter part of the whole infinite area of such a plane.

But if two parallel infinite lines be supposed drawn on such an infinite plane, the area intercepted between them will be likewise infinite; but at the same time will be infinitely less than that space, which is intercepted between two infinite lines that are inclined, though with never so small an angle; for that, in the one case, the given finite distance of the parallel lines diminishes the infinity in one degree of dimension; whereas, in a sector there is infinity in both dimensions: and consequently the quantities are the one infinitely greater than the other, and there is no proportion between them.

From the same consideration arise the three several species of infinite space or

solidity; for a parallelopiped, or a cylinder, infinitely long, is greater than any finite magnitude, how great soever; and all such solids, supposed to be formed on given bases, are as those bases in proportion to one another. But if two of these three dimensions are wanting, as in the space intercepted between two parallel planes infinitely extended, and at a finite distance, or with infinite length and breadth, with a finite thickness, all such solids shall be as the given finite distances one to another; but these quantities, though infinitely greater than the other, are yet infinitely less than any of those wherein all the three dimensions are infinite. Such are the spaces intercepted between two inclined planes infinitely extended; the space intercepted by the surface of a cone, or the sides of a pyramid, likewise infinitely continued, &c. of all which notwithstanding, the proportions one to another, and to the *vacuum*, or vast abyss of infinite space (wherein is the locus of all things that are or can be; or to the solid of infinite length, breadth and thickness taken all manner of ways) are easily assignable; for the space between two planes is to the whole as the angle of those planes to the 360 degrees of the circle. As for cones and pyramids, they are as the spherical surface intercepted by them is to the surface of the sphere, and therefore cones are as the versed lines of half their angles to the diameter of the circle: these three sorts of infinite quantity are analogous to a line, surface, and solid; and, after the same manner, cannot be compared, or have no proportion the one to the other.

INFINITESIMALS, among mathematicians, are defined to be infinitely small quantities.

In the method of infinitesimals, the element, by which any quantity increases or decreases, is supposed to be infinitely small, and is generally expressed by two or more terms, some of which are infinitely less than the rest, which being neglected as of no importance, the remaining terms form what is called the difference of the proposed quantity. The terms that are neglected in this manner, as infinitely less than the other terms of the element, are the very same which arise in consequence of the acceleration, or retardation, of the generating motion, during the infinitely small time in which the element is generated; so that the remaining terms express the elements that would

would have been produced in that time, if the generating motion had continued uniform : therefore those differences are accurately in the same ratio to each other as the generating motions or fluxions. And hence, though in this method infinitesimal parts of the elements are neglected, the conclusions are accurately true without even an infinitely small error, and agree precisely with those that are deduced by the method by fluxions.

For example, (pl. CXLVI. fig. 1.  $n^{\circ} 1$ .) when DG, the increment of the base AD, of the triangle ADE, is supposed to become infinitely little, the trapezium DGHE (the simultaneous increment of the triangle) consists of two parts, the parallelogram EG, and the triangle EIH; the latter of which is infinitely less than the former, their ratio being that of one half DG to AD: therefore, according to this method in fluxions, the part EIH is neglected, and the remaining part, viz. the parallelogram EG is the difference of the triangle ADE. Now it was shown, (see the article FLUXIONS,) that EG is precisely that part of the increment of the triangle ADE which is generated by the motion with which this triangle flows, and that EIH is the part of the same increment which is generated in consequence of the acceleration of this motion, while the base, by flowing uniformly, acquires the augment DG, whether DG be supposed finite or infinitely little.

Example 2. The increment DELM HG (*ibid.*  $n^{\circ} 2$ .) of the rectangle AE, consists of the parallelograms EG, EM, and Ib; the last of which, Ib, becomes infinitely less than EG or EM, when DG and LM, the increments of the sides, are supposed infinitely small; because Ib is supposed to EG as LM to AL, and to EM as DG to AD; therefore, Ib being neglected, the sum of the parallelograms EG and EM is the difference of the rectangle AE: and the sum of EG and EM is the space that would have been generated by the motion with which the rectangle AE flows continued uniformly, but that Ib is the part of the increment of the rectangle which is generated in consequence of the acceleration of this motion, in the time that AD and AL, by flowing uniformly, acquire the augments DG and LM. The same may be observed in propositions wherein the fluxions of quantities are determined; and thus the man-

ner of investigating the differences, or fluxions of quantities, in the method of infinitesimals, may be deduced from the principles of the method of fluxions. For instead of neglecting EIH because it is infinitely less than EG,  $n^{\circ} 1$ . (according to the usual manner of reasoning in that method) we may reject it; because we may thence conclude, that it is not produced in consequence of the generating motion DG, but of the subsequent variations of this motion. And it appears why the conclusions in the method of infinitesimals are not to be represented as if they were only near the truth, but are to be held as accurately true.

In order to render the application of this method easy, some analogous principles are admitted, as that the infinitely small elements of a curve are right lines, or that a curve is a polygon of an infinite number of sides, which being produced, give the tangents of the curve; and by their inclination to each other measure the curvature. This is as if we should suppose, when the base flows uniformly, the ordinate flows with a motion which is uniform for every infinitely small part of time, and increases or decreases by infinitely small differences at the end of every such time.

But however convenient this principle may be, it must be applied with caution and art on various occasions. It is usual therefore, in many cases, to resolve the element of the curve into two or more infinitely small right lines; and sometimes it is necessary, if we would avoid error, to resolve it into an infinite number of such right lines, which are infinitesimals of the second order. In general, it is a postulatam in this method, that we may descend to the infinitesimals of any order whatever, as we find it necessary; by which means, any error that might arise in the application of it may be discovered and corrected by a proper use of this method itself. For an example of this, see Maclaurin's Fluxions, article 498.

It is likewise to be observed, when the value of a quantity that is required in a philosophical problem becomes, in certain particular cases, infinitely great or infinitely little, the solution would not be always just though such magnitudes were admitted. As when it is required to find by what centripetal force a curve could be described about a fixed point that is either in the curve, or is so situated,

ated, that a tangent may be drawn from it to the curve, the value of the force is found infinite at the center of the forces in the former case, and at the point of contact in the latter; yet it is obvious, that an infinite force could not deflect the line described by a body that should proceed from either of these points, into a curve; because the direction of its motion in either case passes thro' the center of the forces, and no force, how great soever, that tends towards the center could cause it to change that direction. But it is to be observed; that the geometrical magnitude by which the force is measured, is no more imaginary in this than in other cases, where it becomes infinite; and philosophical problems have limitations that enter not always into the general solution given by geometry.

But to obviate these scruples, which the brief manner of proceeding in the method of infinitesimals is apt to suggest to such as enter on the higher parts of geometry, after having been accustomed to a more strict and rigid kind of demonstration in the elementary parts. To such it may seem not to be consistent with the perfect accuracy that is required in geometrical demonstration, that, in determining the first differences, any part of the element of the variable quantity should be rejected, merely because it is infinitely less than the rest, and that the same part should be afterwards employed for determining the second and higher differences, and resolving some of the most important problems. Nor can we suppose that their scruples will be removed, but rather confirmed, when they come to consider what has been advanced by some of the most celebrated writers on this method, who have expressed their sentiments concerning infinitely small quantities in the precise terms; while some of them deny their reality, and consider them only as incomparably less than finite quantities, in the same manner as a grain of sand is incomparably less than the whole earth; and others represent them, in all their orders, as no less real than finite quantities. From what has been said, it will appear that a satisfactory account may be given for the more brief way of reasoning used in the method of infinitesimals; and that when we investigate the first differences, we may reject the infinitesimal part of the element, not merely because they are infinitely less than the other parts; but because the quantities

generated, and their mutual relations, depend upon the generating motions, and are discovered by them. The same infinitesimal parts of the element, however, may serve for measuring the acceleration or retardation of those motions from that term, or the powers which may be conceived to accelerate or retard them at that term: and here the infinitely small parts of the element that are of the third order, are neglected for a similar reason, being generated only in consequence of the variation of those powers from that term of the time. In this manner we presume some satisfaction may be given to the scrupulous (who may be apt to demur at the usual way of reasoning in this method) while nothing is neglected without accounting for it; and thus the harmony may appear to be more perfect betwixt the method of fluxions and that of infinitesimals.

But, however safe and convenient this method may be, some will always scruple to admit infinitely little quantities, and infinite orders of infinitesimals, into a science that boasts of the most evident and accurate principles, as well as of the most rigid demonstrations; and therefore in this article, more unexceptionable postulate have been used. In order to avoid such suppositions, Sir Isaac Newton considers the simultaneous increments of the flowing quantities as finite, and then investigates the ratio, which is the limit of the various proportions, which those increments bear to each other, while he supposes them to decrease together, till they vanish; which ratio is the same with the ratio of fluxions.

**INFIRMARY**, a kind of hospital, where the weak and sickly are properly taken care of. See **HOSPITAL**.

**INFLAMMABILITY**, that property of bodies, which disposes them to kindle, or catch fire. See the articles **FIRE**, **FLAME**, **HEAT**, &c.

According to Dr. Shaw, the oil, contained in bodies, is the sole principle of their inflammability. See **FUEL**.

From many experiments Boerhaave found, that all those parts of vegetables, which are capable by fire of making a true flame, are easily miscible among each other, when pure, simple, and inflammable. Thus alcohol, which is the only known body perfectly inflammable, however prepared, provided it be pure, may be intimately mixed with any other alcohol prepared in any other manner, without

without the least alteration thence arising. So also all pure oils, when rightly purged of other parts, will mix thoroughly with each other. Nay, all the purest oils, and even alcohol itself, may be so accurately mixed together, as to form one homogeneous fluid, in which the best microscopes shall not be able to discern the least diversity of parts; which, however, is to be understood with this restriction, that there be not the smallest drop of water in such oil or alcohol. So also camphor, which may be reckoned among the vegetable solids, burns wholly away, dissolves and mixes intimately, not only in alcohol, but in any pure oil: and the like holds of other perfectly inflammable vegetables, which mix in oils or alcohol the more thoroughly, as they are more entirely inflammable. The same holds of resins, balsams, and gum-resins, which, when mixed under the conditions above specified, may be liquified even by a small degree of heat, or even run spontaneously. Nor must it be omitted, that all perfectly inflammable bodies contain certain viscid parts, which produce a brisk cohesion; and that many of them are incapable of being frozen by any degree of cold hitherto known, as appears in linseed oil. See COLD, FROST, FREEZING, OIL, and ALCOHOL. But what appears most wonderful in regard to the inflammability of bodies, is the production of actual flame by the mixture of two cold liquors. The mixture which most constantly and happily produces this effect, is oil of turpentine with an aqua fortis, made in the following manner: take two pounds of dried and powdered nitre, which mix with one pound of concentrated oil of vitriol, or of common oil of vitriol of a sufficient strength: distil this mixture in a retort with a reverberatory fire, and the liquor thereby raised will be an aqua fortis, capable of producing fire and flame with oil of turpentine without any farther assistance. But without being at the trouble of making an aqua fortis on purpose, if well dephlegmated spirit of nitre be mixed with a sufficient quantity of well rectified oil of vitriol, this mixture will give fire very readily with oil of turpentine, or any other aromatic oil. The proportions are an ounce of the spirit of nitre, half an ounce of the oil of vitriol, and an ounce of oil of turpentine; tho' Mr. Geoffroy tells us, he has succeeded very well with a dram of

spirit of nitre, a dram of oil of vitriol, and three drams of oil of turpentine. This experiment, performed with turpentine instead of its oil, is extremely diverting, as the flame not only continues longer, but there are a great many successive explosions.

**INFLAMMATION**, in surgery and medicine, is defined to be a pressure and attrition of the red arterial blood, stagnating in the smallest canals, produced by the motion of the rest of the blood, thrown into a violent and forcible commotion, by means of a fever. See the article FEVER.

This definition of an inflammation is taken from its causes. Others define it from its symptoms to be a species of tumour attended with a burning heat, pain, redness, resistance, and a continual pulsation and pricking. See TUMOUR.

Inflammations are either external, being such as fall properly under the business of surgery, and are cured by manual operations and topical remedies; or internal, being such whose cure is to be expected chiefly from the use of internal remedies.

*General division of external INFLAMMATIONS.* External inflammations, seated in the common integuments, are generally termed phlegmons but when slighter, they are called furuncles. The inflammation which is not fixed deep, but only spreads superficially on the skin, is usually distinguished by the name of an erysipelas; and the inflammatory tumour that arises at the finger-ends, is termed paronychia; when the inflammation fixes in the groin or armpits, the tumour is called a bubo; when under the ears, parotis. If an inflammation seizes the hands and feet from extreme cold, chilblains arise: other inflammations have also particular names, according to the particular part of the body they possess.

*General causes of external INFLAMMATIONS.* The cause of a phlegmon, or an external inflammation, arises generally from too thick or viscid a state of the blood, stagnating in the anastomoses of the smallest arteries and veins; so that the blood being sent in larger quantities than it can pass thro' those vessels, must of consequence excite the fore-mentioned general symptoms of an inflammation, and must occasion great disorders at every part where such stagnation is made. And tho' no part of the body, whether

external



external or internal, nor the bones themselves are exempt from this kind of inflammation, yet it more frequently happens in the fat and glands than any where else.

With regard to the cause whence that inspissation and stagnation in those vessels proceeds, they are, according to Heister, of two kinds, of which the first may be called external, and the latter internal. Among the external causes are placed in the first rank all wounds, fractures, luxations, contusions, punctures by thorns and splinters, with a too great compression of the vessels, whether by too strict a bandage, or otherwise. To these causes may be added burns of all sorts, extreme cold, too violent a motion of the body, the external or internal application of too sharp and stimulating substances, sticking plasters, oily and fat things, with abundance of the like nature, which stop up the pores of the skin, and impede the free course of the blood. Amongst the internal causes, the same author reckons any thing acrimonious in the fluids, as in the scurvy; as also from the blood's abounding in too great quantities, or being of too thick a consistence; or lastly, when it circulates in the body with too violent a motion: for by this means the grosser particles of the blood are drove, and, as it were, wedg'd into smaller vessels, than they can readily find a passage through, and this, more especially, when a sudden cold is spread over a body that is in a great heat. In short, every thing will produce an obstruction which makes the parts of the blood too gross and bulky, or too much contracts the mouths of the small vessels.

*General crises and cure of* INFLAMMATIONS. Inflammations terminate variously, according to their different degrees of violence, the causes from whence they arise, the parts which they affect, and the particular constitution of the patient, with several other circumstances which also presage to us what shall be the end of the inflammation. But the several ways wherein an inflammation terminates are chiefly four. It is either, 1. so dispersed and resolved as to vanish without leaving any considerable injury in the part affected, and which afterwards recovers its former vigour, and is of all others, the best course it can take; or else, 2. the inflammation suppurates, and degenerates into an abscess, so as to leave ever after some damage in the organ; or else, 3.

the inflammation degenerates into a gangrene, or sphacelus; or lastly, into a hard tumour, commonly called a scirrhus, which grows more compact in the part affected, as the inflammation remits or goes off.

As to the resolution and dispersion of an inflammation, that is usually practicable, when it is only of a milder kind, in a sound habit of body, when the blood is not yet too viscid nor vehement in its motion; and this treatment we have delivered already under the article DISPERSION.

But suppuration follows, when the inflammation is more violent, the circulation more rapid, but yet the mass of blood somewhat temperate, and without much acrimony: the treatment of an inflammation that terminates in a suppuration, the reader will find delivered under the articles SUPPURATION, ABSCESS, &c.

When the forementioned symptoms are much more violent, and when the blood is at the same time more acrimonious and rapid than it ought to be, the inflammation generally terminates in a gangrene, the nature and treatment of which see under the article GANGRENE. But if the inflamed part be full of glands, and the blood very thick, glutinous, and inspissated, the small blood-vessels are then so strongly stuffed up with the glutinous blood, that they are compacted together, the parts lose their sensation, and are converted into a hard tumour, which is thence called a scirrhus. See the article SCIRRHUS.

INFLAMMATION *in the breasts*, a disorder most incident to child-bearing women, and almost constantly happens in a few days after their delivery.

If the milk should be propelled too plentifully and forcibly into the breast, which at such times frequently happens; and if the mother should then be seized with cold, fear, anger, or a sudden perturbation of mind, the sanguiferous and lactiferous vessels being thence obstructed, the breasts must then become inevitably tumid, which will be attended with great heat, redness, resistance, and violent pain. The same accident often happens to women that give suck even a long time after their lying in, and is sometimes the case of those who have no milk, all proceeding from the causes already mentioned; and Heister gives us an instance of a man's breast being in-

flamed by means of a great fright. These inflammations do not, according to that author, always happen to be equally intense and violent; for sometimes it seizes the whole breast; sometimes only one side; and at other times occupies only a small part of the breast: sometimes the inflammation lies very near the skin; at other times very deep; and at one time it has urgent symptoms, and at another, it sits easy on the part.

This disorder may be speedily removed in women of condition, and such as do not suckle their children, if some of the plaster of *Sperma ceti* spread on linnen be applied warm all round the breast soon after parturition; being perforated in the middle, to transmit the papilla or nipple; the accession of the milk being also repelled by a very strait bandage. Among the internal remedies, the most proper are such as bring down the lochia puerperarum, when they do not flow in sufficient plenty of themselves: the principal remedies for this purpose are the essence of myrrh, amber, the essence of saffron, elixir proprietatis, &c. Lastly, with respect to the proper drink, it must be carefully observed to diminish the quantity of milk by smallness and poverty of the meat and drink, upon which account the patient should be recommended to drink small broth, tea, or the like watry liquors: and if the mother be desirous of suckling the infant, there can be no better preservative against the inflammations of the breasts. But when the inflammation is fixed, the cure must be attempted either by dispersion or suppuration, for the method of which see **DISPERSION, and SUPPURATION.**

But if it happens that the tumour will neither yield to dispersion nor suppuration, and is in danger of turning to a scirrhus, or cancer, the patient must be kept in good spirits, and the plaster of *Sperma ceti* be constantly retained on the tumour, by which means it will probably either grow less, or else vanish.

For other kinds of external inflammations, see the articles **FURUNCLE, ERYSIPELAS, PARONYCHIA, BUBO, PAROTIS, &c.**

But internal inflammations, or such whose cure is to be expected chiefly from the use of internal remedies, are in particular as follow.

**INFLAMMATION of the bladder**, that attended with an acute, burning, pressing pain, in the region of the pubes, a fever,

and a continual tenesmus, or desire of going to stool, and a perpetual striving to make water.

Other symptoms of this disease are a rumbling of the bowels, griping pains, great anxiety of the precordia, difficult breathing, want of appetite, and vomiting, coldness of the extreme parts, a hard, quick, unequal, contracted pulse, inquietude, and sometimes convulsions.

There is another kind which is more superficial, and is either rheumatic or erysipetulous, in which the fever is more easily and speedily cured, by promoting a diaphoresis; and persons in years, who are affected with the scurvy, gout, rheumatism, or violent head-achs, are most subject to it, especially if they catch cold from a north wind. The former arises commonly from the stoppage of the menses, bleeding, piles, or other usual sanguinary evacuations, and not seldom from a virulent gonorrhœa, unskillfully suppressed by astringents; or when treated by medicines of too sharp and hot a nature.

This disease is mortal, if it terminates in an ulcer, or mortification: the latter is immediate death.

The cure must be attempted, says Hoffman, with bleeding in the foot, if a suppression of the menses or hæmorrhoidal flux be the cause. If it proceeds from the scurvy, &c. recourse must be had to gentle diaphoretics, diluents, and remedies which obtund the acrimony of the humours, such as decoctions of the root of scorzonera, china, skirrets, and fennel. Also infusions in the manner of tea of the tops of yarrow, flowers of mallows, winter cherries, and seed of daucus made with milk, and sweetened with syrup of marsh-mallows. To these may be added emulsions of the four cold seeds. If the patient is costive, manna will be proper with antimoniated nitre, to which rhubarb may be joined, as occasion requires. If the disease is violent, diaphoretic powders with nitre, in a larger proportion than ordinary, as also five grains of saffron, and two of camphire, with the emulsions aforesaid. Externally antispasmodics and gentle discutients will be proper; for which purpose it was Hoffman's method to apply bladders, filled with a decoction of emollient flowers. If the tenesmus and difficulty of urine arise from spasms, there is nothing better than the vapours of a decoction in milk of the flowers of melilot, elder, chamomile,

chamomile and mallows, and the tops of yarrow. This decoction may be put into a close-stool, and the patient sit over it.

**INFLAMMATION of the brain.** See the article PHRENSY.

**INFLAMMATION of the diaphragm.** See the article PARAPHRENITIS.

**INFLAMMATION of the eyes.** See the article OPHTHALMIA.

**INFLAMMATION of the fauces.** See the article QUINSEY.

**INFLAMMATION of the intestines,** according to Boerhaave, is an inflammation contracting the intestines, and stopping up the passage thro' them ; attended with a vehement fixed, burning pain, which is irritated by things taken inwardly. When the inflammation is in the upper part of the intestines, the stomach will be greatly distended with wind. When the pain is exasperated, it produces convulsions of the diaphragm and abdominal muscles, vomiting, and painful inflations, with rumblings and sharp griping pains, which may bring on the iliac passion, or twisting of the guts. Hoffman says, that when there is a burning pain in the abdomen, with a preternatural heat of the whole body, as also a quick pulse, loss of strength, anxiety and inquietude, the seat of the disease may justly be suspected to be in the intestines. If the pain is above the navel, and below the stomach, attended with a fever, nausea, and reaching, it is a sign that that part of the colon is affected, which lies beneath the stomach, and is extended from the right to the left side. If the pain lies in the right hypochondrium, under the spurious ribs, it shews that part of the colon to be inflamed where it joins with the ilium. When the complaint is on the left side, under the loins, where the psoas muscle is placed, it is a sign that the colon, and that part of the mesentery joined thereto, is the seat of the disease, especially when it adheres to the peritonæum : but when the pain is in the middle of the abdomen about the navel, it shews the small guts are certainly affected. In all which cases the pain is supposed to be attended with a fever.

Arbuthnot advises, that this disease be carefully distinguished from a colic, proceeding from a cold cause, because what is good for the latter is poison in the former. It must have a speedy remedy, or it will soon, according to that writer, end in the iliac passion, or a mortifi-

cation. Besides copious bleeding, he thinks, there is scarcely any other method of cure than fomenting and relaxing the bowels with emollient liquids taken warm, both by the mouth and in clysters, and this every hour. Warm fomentations, or young, vigorous, and sound animals applied to the body are extremely beneficial.

Boerhaave directs, that the patient should only be nourished with broth, in which gently detergent roots have been boiled.

After bleeding and clysters, if the pain continues violent, Hoffman is of opinion that there will be no manner of danger in giving opiates, by which means the excruciating pain will be alleviated, and the spasms appeased, and a breathing sweat will follow. When this is done, and the fever abated, there will be no occasion to continue the dilating, relaxing and moistening medicines, but rather the nervous and corroborating ; such as the preparations of amber, especially the salt and tincture ; the former of which may be given in a bolus from six to sixteen grains, and the latter from twenty to eighty drops, in any convenient vehicle.

If the patient survives three days, and the acuteness of the pain abates with a chillness and shivering throughout the body, it is a sign of a suppuration, and within fourteen days the imposthume will break, and if it falls into the cavity of the abdomen, it will corrupt the whole mass of fluids, putrify the viscera, and turn to an ascites, whence the patient will die of a consumption. In this case, Boerhaave and Arbuthnot recommend whey and chalybeat waters, as likely to prove most beneficial. The imposthume may also turn either to a gangrene or scirrhus, both which are mortal.

**INFLAMMATION of the kidneys.** See the article NEPHRITIS.

**INFLAMMATION of the liver.** When the liver is inflamed, it compresses the stomach, diaphragm, and the neighbouring viscera of the abdomen ; it stops the circulation of the fluids, hinders the generation and excretion of the gall, and all digestion ; it produces a great many bad symptoms, as the jaundice, with all the diseases depending thereon. See the article HEPATITIS.

A fever, an inflammation, and pungent pain on the region of the liver, and diaphragm, a tension of the hypochondria, yellowness of the skin and eyes, and a

saffron-coloured urine, are signs of an inflammatory disposition of the liver. See the article JAUNDICE.

This disease terminates as other inflammations ; being cured by resolution, concoction, and excretion, of the morbid matter ; or it terminates in an abscess, icterhus, or gangrene. See ABSCESS, &c. During the first state, Arbuthnot tells us, that a warm regimen and saffron, which some reckon a specific, are improper. On the other hand, that cooling, resolving liquors, taken inwardly, as whey and sorrel boiled in it, outward fomentations, and frequent injections of clysters, bathing and frictions, relax and render the matter fluid. Honey, with a little rhenish wine and vinegar, the juices and jellies of some ripe garden-fruits, and those of some lactescent plants, as endive, dandelion, and lettuce, are resolvent. Violent purging hurts ; gently relaxing the belly relieves, diluents with nitrous salts are beneficial, or tamarinds boiled in warm water, or whey. The feverish matter is often carried off by urine, and therefore diuretics not highly stimulating are proper.

If the inflammation be recent, extremely violent, and without any signs or hopes of resolution, concoction, and excretion, Boerhaave advises, that the case be treated with the same cautions and remedies as is directed in pleuritis, and other similar inflammatory disorders ; such remedies only excepted, as the situation of the part affected cannot admit of, except only, that all antiphlogistic fluids, either drank or injected by clysters, are particularly serviceable in the case before us.

*INFLAMMATION of the lungs.* See the article PERIPNEUMONY.

*INFLAMMATION of the pleura.* See the article PLEURISY.

*INFLAMMATION of the stomach* is known by a burning, fixed, and pungent pain in the stomach, which is exasperated at the instant any thing is taken into it, and is succeeded by a most painful vomiting and hiccough. There is, besides, an inward heat, anxiety, and a tensile pain about the precordia, an acute continual fever, great thirst, difficult breathing, inquietude, tossing of the body, coldness of the extreme parts, a hard, contracted, quick, and sometimes, unequal pulse. In the medical essays, we have an instance of this disease being attended with a hydrophobia. See HYDROPHOBIA.

Boerhaave says, that this disease, if not suddenly cured, is generally mortal : therefore, that as soon as it is discovered, plentiful bleeding is necessary, that the patient's drink should be very soft, antiphlogistic, and emollient ; and also that clysters of the same kind should be administered to him.

Arbuthnot advises, that the patient should totally abstain from every thing that has acrimony in it ; even the cooling nitrous salts, which are beneficial in other inflammations, irritate too much. Vomits, cordials, and spirituous liquors, are little better than poison : milk generally curdles. Aliments must be given frequently, and by a spoonful at a time, for any distension increases the inflammation. A thin gruel of barley, oatmeal, whey, with a very little sugar, or honey, or chicken broths, are proper aliments : whey-emulsions, barley-water, and emollient decoctions are proper drinks. If poisons of the caustic kind or metallic medicines ill prepared cause the inflammation, oily fat things are proper, as new milk, cream, oil of sweet almonds, or oil of olives taken often and plentifully, according to Hoffman. If in the cholera morbus an inflammation is apprehended, he advises absorbents and burnt hart's horn, with gelatinous decoctions of calves and neats feet, or hartshorn-gellies, and water-gruel. Outwardly he recommends the following liniment as useful in all cases ; take oil of sweet almonds, two ounces ; camphire, one dram ; make a liniment, with which anoint frequently the precordia, applying a hot linnen-cloth over it. The following epithem he recommends as an excellent discutient and sudorific. Take of the vinegar of roses, two ounces ; spirit of wine camphorated, two drams ; tincture of saffron, and tincture of castor, of each one dram ; nitre, half a dram : let this epithem be applied warm to the region of the stomach.

If there happens an imposthume, honey, and even honey of roses, taken inwardly, is, according to Arbuthnot, a good cleanser ; and decoctions of comfrey-roots, healing.

*INFLAMMATION of the womb or uterus,* appears from extraordinary heat and a fixed pain in the groin, with an acute fever, a pain in the loins and belly, an inflation of the abdomen, a stimulus to make water and to go to stool, heat, and a difficulty of urine.

Other

Other symptoms, according to Astruc, are a tumour, pain, heat, and tension of the hypogastric region, redness of the os uteri, and great heat of the vagina. If the fore-part of the uterus is affected, there is a dysury; if the back part, a tenesmus; frequent faintings and cardialgia, a burning fever; or, if the inflammation is violent, a lypiria, in which the external parts or extremities are cold, and the internal burn, and the pulse is imperceptible; a delirium and phrensy; the breasts swell, in proportion as the inflamed uterus.

Hoffman distinguishes this disease into the superficial and more profound. He says, that it is easily formed in child-bed women, and frequently accompanies the milk-fever, and may be cured in a few days if rightly managed. But that when it is more intense, and attended with grievous symptoms without remission, it kills on the seventh, ninth, or eleventh day; a white miliary fever generally supervenes, which is the worst omen, as it shews a mortification of the uterus. See the article MILIARY FEVER.

If the inflammation is not resolved, it generally ends in a mortification, ulcer, cancer, or scirrhus. See the article MORTIFICATION, &c.

Women in childbed sometimes have the womb inflamed, from the fault of an unskilful midwife, or hard labour; or the lochia being stopped by pains or hysterical spasms, dread or cold: wherefore proper precautions should be taken to prevent it, for which purpose Hoffman advises to keep them under a gentle diaphoretic regimen, and to allay the almost febrile heat; to which end oil of almonds alone is very proper, or with a fourth part of sperma ceti given daily to half an ounce in chicken-broth: externally the whole abdomen should be anointed with oil of dill, camomile and white lillies, of each an ounce; oil of caraways, a dram; or a dram of camphire; laying a warm napkin doubled over the same. The tumult being thus appeased, the lochia are to be promoted with pills made of bitter extracts, temperate resinous gums and aloes well corrected, of which fifteen grains is a dose, morning and evening, to be continued from five to eight days: these are also good when the after-birth, or part of it is retained. If there is a fever, the belly is distended with wind, the lochia are retained, and the spasms tend to the upper parts; then

the last-mentioned author directs the patient to be bled in the foot, and to render the stagnating blood fluxile by the following mixture. Take chervil-water, the carduus benedict. scordium, elder-flowers, acacia, and distilled vinegar, each an ounce and half; crabs-eyes, a dram and a half; powder of antimony, half a dram; spirit of nitre dulcified, twenty drops; syrup of card. benedict. two drams; let the patient take two or three spoonfuls every two hours. The drink may be chicken-broth with scorzonera-root, succory and shavings of hartshorn boiled therein.

In women out of child-bed, the inflammation generally happens in the neck of the uterus and the vagina, and then besides the foregoing things, the same author recommends the application of epithems to the pubes, uterine injections, pessaries, and suppositories: the epithem may be of arquebuse water, four ounces; essence of saffron, camphorated spirit of wine, of each two ounces; nitre, a dram, dissolved in elder-flower water; and, as circumstances require, mixt with vinegar of rue, or scordium, and applied with a double cloth. The injection may consist of asses-milk with flowers of elder, myrrh, and saffron, and a little nitre may be added to the decoction. The tenesmus may be appeased with emollient half baths, or with one ounce of oil of sweet almonds, and twelve grains of saffron, injected into the anus. These remedies are useful in case of a suppuration.

If it proceeds from external causes, and there is a fever, pain in the groin, difficulty of urine, and costiveness, bleed first in the arm, and then in the foot; give a clyster, and apply melilot-plaster, two ounces; sperma ceti, half an ounce; gum ammoniac, two drams; saffron, one dram; camphire, half a dram, mixt together; not omitting gentle diaphoretics and discutients.

**INFLAMMATORY DISEASES.** To these may be referred the several diseases mentioned in the preceding article, either attended with a fever, as well as lesser inflammations without a fever; besides all chronic disorders arising from inflammations, the chief whereof are old coughs, consumptions and the rheumatism, without a fever. See COUGH, &c.

Hoffman lays down this as an axiom, for all practitioners to observe; that in all inflammatory diseases of the nervous and membranaceous

membranaceous parts, as in the phrenzy, pleurisy, in the inflammation of the liver, stomach, intestines, and bladder, nothing is more pernicious, or brings on death more suddenly, than opiates taken inwardly.

**INFLAMMATORY FEVERS** are distinguished into two stages; the first, whilst the pulse continues hard, in which it is proper to bleed; the second, when the inflammatory symptoms still remaining, the pulse is too low for that evacuation; in this state blisters are the chief remedy, and which, except in a few singular cases, are not to be used sooner. If the blisters are large, it is better to apply them gradually, than many at a time. See the articles **FEVER** and **INFLAMMATION**.

**INFLECTION**, or *Point of INFLECTION*, in the higher geometry, is the point where a curve begins to bend a contrary way. See the article **FLEXURE**.

To determine the point of inflection in curves, whose semi-ordinates  $CM$ ,  $Cm$  (pl. CXLVI. fig. 2. n<sup>o</sup> 1. and 2.) are drawn from the fixed point  $C$ ; suppose  $CM$  to be infinitely near  $Cm$ , and make  $mH = Mm$ ; let  $Tm$  touch the curve in  $M$ . Now the angles  $CmT$ ,  $CMm$ , are equal; and so the angle  $CmH$ , while the semi-ordinates increase, does decrease, if the curve is concave towards the center  $C$ , and increases if the convexity turns towards it. Whence this angle, or, which is the same, its measure will be a minimum or maximum, if the curve has a point of inflection or retrogression; and so may be found, if the arch  $TH$ , or fluxion of it, be made equal to 0, or infinity. And in order to find the arch  $TH$ , draw  $mL$ , so that the angle  $TmL$  be equal to  $mCL$ ; then if  $Cm = y$ ,  $mr = x$ ,  $mT = t$ , we shall have  $y : \dot{x} ::$

$t : \frac{tx}{y}$ . Again, draw the arch  $HO$  to

the radius  $CH$ ; then the small right lines  $mr$ ,  $OH$ , are parallel; and so the triangles  $OLH$ ,  $mLr$ , are similar; but because  $HI$  is also perpendicular to  $mL$ , the triangles  $LHI$ ,  $mLr$ , are also similar:

whence  $t : \dot{x} :: y : \frac{xy}{t}$ ; that is, the

quantities  $mT$ ,  $mL$ , are equal. But  $HL$  is the fluxion of  $Hr$ , which is the distance of  $Cm = y$ ; and  $HL$  is a negative quantity, because while the ordinate  $CM$  increases, their difference  $rH$  decreases; whence  $\dot{x}x + \dot{y}y - \dot{y}\dot{y} = 0$ , which

is a general equation for finding the point of inflection, or retrogradation.

**INFLECTION**, in grammar, the variation of nouns and verbs, by declension and conjugation. See **DECLENSION** and **CONJUGATION**.

**INFLEX LEAF**, among botanists, one whose point bends inward, towards the stem of the plant. See the article **LEAF**.

**INFLUENCE**, a quality supposed to flow from the heavenly bodies, either with their light or heat; to which astrologers idly ascribe all sublunary events.

**INFLUENT FEVER**, the same with a nervous one. See the article **FEVER**.

**INFORCED**, and **INFORCEMENT**. See **REINFORCED** and **REINFORCEMENT**.

**IN FORMA PAUPERIS**, in law. See the articles **FORMA**.

**INFORMATION**, in law, is nearly the same in the crown-office, as what in our other courts is called a declaration. It is sometimes brought by the king, or his attorney-general, or the clerk of the crown-office; and at other times by a private person, who informs or sues, as well for the king as himself, upon the breach of some popular statute, in which a penalty is given to the party that will sue for it. It differs from an indictment, which must be found by the oaths of ten men at least; for an information is only the allegation of the person that brings it. An information lies for offences at common-law, as batteries, conspiracies, nuisances, contempts, libels, seditious words, &c. and in many cases by statute, on which the offender is rendered liable to a fine, or other penalty: an information also lies against the inhabitants of a town, for not repairing the highways, for going armed in affray of the peace, &c. and in general for any offence against the public good, or the principles of justice: but where an information brought is only for vexation, the defendant may bring an information against such vexatious informer. All informations brought by informers on penal statutes, where a certain sum is allowed him, must be brought in the county where the offence was committed, and within a year after the fact was done; but a party aggrieved, not being a common informer, is not obliged to bring his information in the proper county; for he may lay it in what county he pleases. If an informer, without leave of the court, compounds with the defendant, he forfeits 10*l*. and may be set in the pillory.

Where

Where an information is exhibited for trespass, battery, &c. to which the defendant appears and pleads to issue, and the prosecutor does not bring on the trial within a year after the issue joined; or if a verdict pass for the defendant, the court is to allow the defendant costs, unless it appears that there was reasonable cause for the information. 4 & 5 Will. & Mar. cap. xviii. After a plea is put in to an information for any offence, the defendant may be so far indulged by the court, as to appear by his attorney. A replication to an information on a special plea in the courts of Westminster, must be made by the attorney-general; but if it be before the justices of assize, is must be made by the clerk of assize: yet the replication to a general issue on an information *qui tam* (that is, at the suit both of the king and the party) in the courts of Westminster, may be made in the name of the attorney-general only; and in such actions, most of the precedents are for the replication to be made by the plaintiff, and a demurrer may be made to an information *qui tam*, without the attorney-general.

**INFORMER**, a person that informs against or prosecutes another, upon any penal statute. See the preceding article.

**INFORMATUS NON SUM**, in law. See the article **NON SUM INFORMATUS**.

**INFORMIS**, something irregular in its form, or figure. See the article **FIGURE** and **FORM**.

Hence, *stellæ informes*, in astronomy, are such of the fixed stars as are not reduced into any constellation. See the articles **CONSTELLATION** and **STAR**.

**INFRACTION**, a term chiefly used to signify the violation of a treaty. See the article **TREATY**.

**INFRALAPSARIANS**, in church-history, an appellation given to such predestinarians, as think the decrees of God, in regard to the salvation and damnation of mankind, were formed in consequence of Adam's fall. See **PREDESTINATION**.

**INFRASCAPULARIS**, in anatomy, one of the depressor-muscles of the arm, which has its origin from the whole internal surface of the scapula, and its termination in the interior part of the humerus. See the article **DEPRESSOR**.

**INFRASPINATUS**, in anatomy, one of the abductor-muscles of the arm, which has its origin in the cavity below the spine of the scapula. See **ABDUCTOR**.

**INFULA**, in antiquity, a broad kind of fillet, made of white wool, which the priests used to tie round their heads. Hence Virgil, *Æn.* x. 538.

*Infula cui sacra redimibat tempora vittæ.*

**INFUNDIBULIFORM**, in botany, an appellation given to such monopetalous or one-leaved flowers, as resemble a funnel in shape, or which have a narrow tube at one end, and gradually widen towards the limb or mouth. There are two kinds of infundibuliform, or funnel-fashioned flowers; one of which is like an inverted hollow cone, and the other somewhat like a faucer, and thence called hypocrateriform. See **FLOWER**.

**INFUSION**, in pharmacy, a method of obtaining the virtues of plants, roots, &c. by steeping them in a hot or cold liquid.

Hot infusions are made by pouring boiling water, or any other menstruum, on the drugs whose virtues we would extract: thus, in order to obtain the common infusion of senna, take the leaves of senna, an ounce and a half; of crystals of tartar, three drams; of the lesser cardamom-seeds husked, two drams: boil the crystals of tartar in a pint of water till they are dissolved, then pour the water, while boiling hot, upon the senna and the rest; and when the liquor is cold, strain it off.

But all tinctures and infusions of ingredients, whose principal virtues depend upon their lighter or more subtil and spirituous parts should not be made by steeping them in a hot, but in a cold menstruum; and if such infusions be required rich and strong, they are to be made so, not by suffering the menstruum to be heated, or to remain long upon the ingredients, but by adding fresh ingredients several times to the same liquor, infusing them quick, and each time keeping out the ingredients that have been once used: by this means we shall procure the full virtues of simples, unaltered in their nature, yet exalted or concentrated to such a degree, that a few spoonfuls of the liquor shall contain the spirit or quintessence of a pound of the plant. This is an effect not to be expected from fire, which almost constantly alters the nature of things committed to it; nor could a valuable essence of violets, jacinth, lilies, borage-flowers, or any flower or plant of an extremely fine odoriferous spirit, be procured by heat, as it readily  
may

may by steeping these flowers in cold water, cold vinegar, cold wine, and the like; and frequently pouring the tincture upon fresh flowers, till the liquor becomes strongly impregnated.

**INGANNO**, in music, is when having done every thing proper for ending a cadence, a mark of silence is placed instead of the final, which the ear naturally expects, and is deceived. See **CADENCE**.

**INGELSHEIM**, a town of Germany, in the palatinate of the Rhine, eight miles south-west of Mentz: east longit.  $7^{\circ} 40'$ , north lat.  $50^{\circ}$ .

**INGENUITAS REGNI**, antiently signified the commonalty of the realm; and it is said, that this title was likewise given to the barons and lords of the king's council.

**INGENUOUS**, *ingenuus*, in roman antiquity, an appellation given to persons born of free parents, who had never been slaves: for the children of the liberti, or persons who had obtained their liberty, were called libertini, not ingenui; this appellation of ingenuous being reserved for their children, or the third generation.

**ENGINEER**, or **ENGINEER**. See the articles **ENGINEER** and **GUNNERY**.

**INGLUVIES**, the crop or craw of granivorous birds, serving for the immediate reception of the food, where it is macerated for some time, before it is transmitted to the true stomach.

**INGOLSTAT**, a town of Germany, in the circle of Bavaria, situated on the river Danube, thirty miles west of Ratisbon: east lon.  $11^{\circ} 30'$ , and north lat.  $48^{\circ} 45'$ .

**INGOT**, a mass of gold or silver, melted down and cast in a mould, but not coined or wrought. See **GOLD** and **SILVER**.

**INGRAFTING**, or **GRAFTING**, in gardening. See **GRAFTING**.

**INGRAILED**, or **ENGRAILED**, in heraldry. See the article **ENGRAILED**.

**INGRAVING**, or **ENGRAVING**. See the article **ENGRAVING**.

**INGREDIENTS**, in pharmacy, whatever simple medicines enter the composition of a compound one.

**INGRESS**, in astronomy, signifies the sun's entering the first scruple of one of the four cardinal signs, especially aries.

**INGRESS**, **EGRESS**, and **REGRESS**, in law, words frequently used in leases of lands, which signify a free entry into, a going out of, and returning from some part of the premises leased to another.

**INGRESSU**, in law, a writ of entry, termed also a *præcipe quod reddat*. See the articles **ENTRY** and **PRÆCIPE**.

**INGRIA**, a province of Russia, bounded by the lake Ladoga, the river Nieva, and the gulph of Finland on the north, by Novogorod on the east and south, and by Livonia on the west.

**INGROSSER**, one who buys up great quantities of any commodity, before it comes to market, in order to raise the price.

If a person gets into his hands, otherwise than upon a demise or grant of lands, any corn growing, butter, cheese, fish, or other victuals, within the kingdom, with intent to sell the same again at a high price, he shall be deemed an unlawful ingrosser. But the buying of corn to be ground into meal, or for making of starch, in order to sell it again; or barley and oats to make malt and oatmeal, are not included in this statute. Foreign corn and victuals, except fish, are also exempted; as are licensed badgers, fishmongers, butchers, poulterers, &c. that buy in their own ways of dealing, and are not guilty of forestalling, or selling the same again at unreasonable prices by retail. A merchant who imports victuals or merchandize into this kingdom, may dispose of the same in gross; yet the person who purchases them of him, may not do so, since by that means the price would be enhanced. If this was allowed, a monied man might ingross into his hands a whole commodity, with an intent to sell it again at what price he thought proper: but the ingrossing the whole of any commodity is indictable, and the offender, whether he sell any part of them or not, is subject both to a penalty and to corporal punishment, by common law.

**INGROSSER** also signifies a clerk or person who copies records, deeds, or other instruments of law, on skins of parchment.

**INGROSSING** of a fine, is the chirographer's making the indentures of a fine, and also the delivery of it to him on whom it is levied. See the article **CHIROGRAPHER**.

**INGUEN**, in anatomy, the same with what is otherwise called groin, or pubes. See the article **PUBES**.

**INGUINAL**, in anatomy, &c. any thing belonging to the groin. Hence, **INGUINAL HERNIA** is a hernia in that part called by surgeons bubonocoele. See the article **BUBONOCOELE**.

**INHARMONICAL**



**INHARMONICAL RELATION**, in music, is much the same with discord. See the articles **DISCORD** and **RELATION**.

**INHERENCE**, in philosophy, a term sometimes used to denote the connection of an accident with its substratum, or substance. See the articles **ACCIDENT** and **SUBSTANCE**.

**INHERITANCE**, a perpetual right or interest in lands, invested in a person and his heirs.

The term inheritance is used, not only where a person has lands or tenements by descent; but where he becomes seized in fee-simple, or fee-tail, by purchase. The inheritances mentioned in our law are either corporeal or incorporeal: the corporeal relate to lands, tenements, &c. that may be touched or handled; and the incorporeal, to such rights as are annexed to corporeal inheritances, as advowsons, tithes, annuities, offices, &c. There is likewise another inheritance, which is termed several, that is, where two or more hold lands or tenements severally; as when two persons hold to them and the heirs of their two bodies; in which case these two have a joint estate during their lives, but their heirs have several inheritances.

According to the law of inheritances, the first child is always preferred, and the male before the female; and he that has the whole blood, before another that has only a part of the blood of his ancestor.

As to goods and chattels, they cannot be turned into an inheritance.

**INHIBITION**, a writ to forbid a judge's proceeding in a cause that lies before him.

This writ generally issues out of an higher court-christian to an inferior, and is of much the same nature as a prohibition. See the article **PROHIBITION**.

**INHUMATION**, in chemistry, a method of digesting substances by burying the vessel, in which they are contained, in horse-dung or earth. See the article **DIGESTION**.

**INJECTION**, in surgery, the forcibly throwing certain liquid medicines into the body, by means of a syringe, tube, clyster-pipe, or the like.

Many disorders are very difficultly, if at all curable, unless some proper liquor be injected into the parts affected; which is performed by drawing the liquor into the syringe, and forcing it out again into the disordered parts. In doing this, one caution is extremely necessary, *viz.* to apply the instrument very carefully, and to

be mindful that the liquor you inject be not too hot or cold.

As for injections in the gonorrhoea, disorders of the uterus, &c. See the articles **GONORRHOEA**, **FLUOR ALBUS**, **SYRINGE**, &c.

Surgeons also describe the manner of injecting liquors into the veins of living men, or other animals. A vein being opened, usually in the arm, as in bleeding, the small pipe of the syringe is introduced, and the liquor is injected or forced into the vein upwards, towards the heart; which being done, the orifice is to be dressed in the same manner as after bleeding.

Though this practice is at present disused, on account of the bad consequences attending it; yet the injection of proper medicines in apoplexies, quinzies, the hydrophobia, &c. wherein no medicine at all can be taken by the mouth, deserves to be tried.

**Anatomical INJECTION**, the filling the vessels with some coloured substance, in order to make their figures and ramifications visible.

For this purpose, a fine red injection is prepared thus: pour a pint of oil of turpentine on three ounces of vermilion, stir them well together, and then strain all through a fine linnen-cloth. If a green injection is wanted, distilled verdigrease may be used instead of the vermilion.

A coarse injection may be made of one pound of tallow, five ounces of white-wax, three ounces of oil of olives, melted together, and adding two ounces of venice-turpentine; and when this is dissolved, three ounces of vermilion or verdigrease, are to be thoroughly mixed with the other ingredients, and the whole strained through a linnen-cloth.

For the manner of preparing bodies to be injected, see the article **PREPARATION**.

**INITIATED**, in antiquity, a term chiefly used in speaking of persons who were admitted to a participation of the sacred mysteries among the heathens. See the article **MYSTERY**.

**INJUNCTION**, in law, is a writ or kind of prohibition granted in several cases; and for the most part grounded on an interlocutory order or decree, made in the court of chancery or exchequer, for staying proceedings either in courts of law, or ecclesiastical courts. An injunction is obtained either for not appearing and putting in an answer in due time, upon equity confessed, or upon matter that ap-

pears on record. If it be for staying suits in other courts, it is grantable on suggestion of some matter, by which the plaintiff is rendered incapable of making his defence there, either for want of witnesses, from his being sued at law for what in equity he ought not to pay, or because the court, in which he is sued at law, acts erroneously, or denies him the benefit of the law, &c. Sometimes it issues on the defendant's non-appearance, to give a complainant possession of lands, &c. and sometimes for staying waste, in which last case an affidavit must be first made, of waste committed in lands, &c. This writ is directed not only to the party himself, but to all and singular his counsellors, attorneys, and solicitors; and, therefore, if any attorney, after having been served with an injunction, proceeds against the party that obtained it, the court, out of which it issued, will commit him to the fleet-prison for contempt: but as an injunction ought not to be granted in a criminal case, so whenever this happens, the court of king's bench may break it, and protect those that proceed in contempt of it.

**INJURY**, any wrong done to a man's person, reputation, or goods. See the articles **ASSAULT**, **TRESPASS**, &c.

**INK**, *atramentum*, a black liquor generally made of an infusion of galls, copperas and a little gum arabic. See the article **GALLS**, **COPPERAS**, &c.

To make a very good ink for writing: take three ounces of good galls, reduced to powder, which infuse in three pints of river or rain-water, setting it in the sun or a gentle heat, for two days; then take common copperas, or green vitriol, three ounces, powder it, put it into the infusion, and set it in the sun for two days more; lastly, shake it well, and add an ounce of good gum arabic.

To make the London powder-ink: take ten ounces of the clearest nut-galls, which reduce to a fine powder; then add two ounces of white copperas, four ounces of roman vitriol, and of gum arabic or sandarach an ounce; pound and sift them very fine. This powder, though whitish itself, will, when put into water, turn it to a good black ink: an ounce of the powder serves to make a pint of ink.

To make a shining ink: take gum arabic and roman vitriol, of each an ounce; galls well bruised, a pound; put them into rape-vinegar, or vinegar made of clear small beer; set them in a warm

place, stir them often till the liquor becomes black, and then add to a gallon of this preparation an ounce of ivory-black, and a quarter of a pint of seed-lac-varnish.

To make a shining japan or china ink: take an ounce of lamp-black, and clarify it in an earthen pipkin, to take out the dross; two drams of indigo; half a dram of peach-black; one dram of black endive, burnt; reduce them to a very fine powder, and then take a moiety of fig-leaf-water, another part of milk, and a very little gum arabic, and mixing all the ingredients well together, make them up for use.

**Printing Ink** is made by boiling or burning linseed-oil till it is pretty thick, adding a little rosin to it, while hot, and then mixing this varnish with lamp-black.

Printing-ink, on its being imported from abroad, pays 7s. 8  $\frac{4}{10}$ d. the hundred weight, of which 6s. 9d. is repaid on its exportation.

**INK** is also an appellation given to any coloured liquor, used in the same manner as the atramentum, or black ink; as red, green, blue, yellow, &c. inks.

Red ink is made thus: take wine-vinegar a pint; rasings of brazil, one ounce; alum, half an ounce; boil them gently, and add five drams of gum arabic: dissolve the gum, strain the ingredients, and keep the liquid for use.

Green ink is made by boiling verdigrease with argol, in fair water, and adding a little gum arabic.

Blue ink is made by grinding indigo with honey and the white of eggs, and making it fluid with water.

Yellow ink is made by an infusion of saffron in water, with a little alum and gum arabic.

**Sympathetic Ink**, a liquor with which a person may write, without the letters appearing, till some means be taken to render them legible.

Of this kind are the glutinous juices of plants, or any other thick and viscid fluids, provided they have no remarkable colours themselves; for being written on white paper, nothing will appear, till some fine powder of any coloured earth is thrown over the paper, whereby the letters become legible: the reason of this is evident, as the powder sticks only to the letters formed by the invisible but viscid liquor.

Another sort of sympathetic inks are made of infusions, the matter of which easily

easily burns to a charcoal: thus, if a scruple of sal armoniac be dissolved in two ounces of fair water, letters written therewith will be invisible till held before the fire; for the sal armoniac being burnt to a charcoal, by a heat not strong enough to scorch the paper, the letters are thereby rendered visible.

Another sort of sympathetic inks are made of a solution of lead in vinegar, and a lixivium of lime and orpiment; for if a letter be written with the former, nothing will appear: but to conceal the affair still more, some different subject may be written above it, with a black ink made of burnt cork and gum-water; then, if a piece of cotton, wetted with the said lixivium, be rubbed over the paper, the sentence that was visible will disappear, and the invisible one, before written with the solution of lead, will be seen in its place very black and strong.

**INLAGATION**, the restoring an outlawed person. See **OUTLAWRY**.

**INLAND bills of exchange**, those payable in distant parts of this kingdom.

If any such bills be lost, or miscarry, within the time limited for payment, the drawer is obliged to give other bills of the same tenor; security being given, if demanded, in case the lost bill be found again. In case the party on whom an inland bill of exchange shall be drawn, shall refuse to accept the same, the party to whom payable shall cause such bill to be protested for non-acceptance, as in case of foreign bills; for which protest he shall pay two shillings, and no more. See **BILL**, **ACCEPTANCE**, **PROTEST**, &c.

**INLAYING**, the art of marquetry. See the article **MARQUETRY**.

**INN**, a place appointed for the entertainment and relief of travellers.

Inns are licensed and regulated by justices of the peace, who oblige the landlord to enter into recognizances for keeping good order. If a person who keeps a common inn, refuses to receive a traveller into his house as a guest, or to find him victuals and lodging, on his tendering a reasonable price for them, he is liable to an action of damages, and may be indicted and fined at the king's suit. The rates of all commodities sold by inn-keepers, according to our antient laws, may be assessed: and inn-keepers not selling their hay, oats, beans, &c. and all manner of victuals, at reasonable prices, without taking any thing for litter, may be fined and imprisoned, &c.

by 21 Jac. I. cap. xxi. Where an inn-keeper harbours thieves, persons of an infamous character, or suffers any disorders in his house, or sets up a new inn where there is no need of one, to the hindrance of antient and well governed inns, he is indictable and fineable; and by statute, such inn may be suppressed. Action upon the case lies against any inn-keeper, if a theft be committed on his guest, by a servant of the inn, or any other person not belonging to the guest; though it is otherwise where the guest is not a traveller, but one of the same town or village, for there the inn-keeper is not chargeable; nor is the master of a private tavern answerable for a robbery committed on his guest: it is said, that even though the travelling guest does not deliver his goods, &c. into the inn-keeper's possession, yet if they are stolen, he is chargeable. An inn-keeper is not answerable for any thing out of his inn, but only for such as are within it; yet where he, of his own accord, puts the guest's horse to grass, and the horse is stolen, he is answerable, he not having the guest's orders for putting such horse to grass. The inn-keeper may justify the stopping of the horse, or other thing of his guest, for his reckoning, and may detain the same till it be paid. Where a person brings his horse to an inn, and leaves him in the stable, the inn-keeper may detain him till such time as the owner pays for his keeping; and if the horse eats out as much as he is worth, after a reasonable appraisement made, he may sell the horse, and pay himself: but when a guest brings several horses to an inn, and afterwards takes them all away except one, this horse so left may not be sold for payment of the debt for the others; for every horse is to be sold, only to make satisfaction for what is due for his own meat.

**INNS of court**, are colleges in London, for the study of the laws of England, with all conveniencies for the lodging and entertainment of the professors and students.

In these colleges, there are not only such students as study the laws of this kingdom, in order to render themselves capable of practising in the courts of law at Westminster; but also such other gentlemen of fortune as apply themselves to this study, in order to know and vindicate their rights, and to render themselves more serviceable to their country.

Our inns of court, which are numerous, and justly famed for the production of men of learning, are governed by masters, principals, benchers, stewards, and other officers, and have public halls for exercises, readings, &c. which the students are obliged to attend and perform for a certain number of years, before they can be admitted to plead at the bar. These societies have not, however, any judicial authority over their members; but instead of this they have certain orders among themselves, which have, by consent, the force of laws: for lighter offences, persons are only excommunicated, or put out of commons; for greater, they lose their chambers, and are expelled the college; and when once expelled out of one society, they are never received by any of the others. The gentlemen in these societies may be divided into benchers, outer-barristers, inner-barristers, and students.

The four principal inns of court are the Inner-temple, Middle-temple, Lincoln's inn, and Gray's inn; the other inns are the two serjeant's inns; and the others, which are less considerable, are Clifford's inn, Symond's inn, Clement's inn, Lion's inn, Furnival's inn, Staple's inn, Thavies inn, Barnard's inn, and New-inn. These are mostly taken up by attorneys, solicitors, &c. but they belong to the inns of court, who send yearly some of their barristers, to read to them.

**INN-AND-INN**, a game on dice, very much practised at an ordinary, may be played by two or three, each having a box in his hand. There are four dice, and you may drop what you please, six-pences, shillings, &c. or guineas. Every inn, you drop; and every inn-and inn, you sweep all: likewise, if you throw out, if but two play, your adversary wins all; but if three play, the stake may be divided between the other two, or played for.

Here you are to observe, that out, is when you have thrown no doublets on the four dice; inn, is when you have thrown two doublets of any sort; and inn-and-inn, is when you throw all doublets, whether of any sort, or otherwise; as four aces, &c. or two aces, &c. and two of any other denomination. The battle may be for as much or as little as you please, and is not ended till every penny of that money be won: this seems just, since in a battle of ten pounds, a gentleman hath

been reduced to five shillings, and yet hath won the battle at last.

Like all other games, this too has its tricks; we shall only mention one instance by way of example: a gentleman who had spent the greater part of his patrimony, bethought himself how he should retrieve it; and having been a considerable loser by gaming, he fixed on this as the basis of his future settlement; accordingly he at length contrived a box, not screwed within as usual, which, nevertheless, was so well painted as to look exactly like a screwed box; it was likewise but half board wide at top, and, narrow at bottom, so that he had the dice wholly under his own management. In short, with this box, and the artful placing of the dice, he won a thousand pounds the first night, at the game of inn-and-inn; next night he won an estate of two hundred a year; on which he forswore all gaming for the future, well knowing how many have been ruined by it.

**INN**, in geography, a large river which rises in a mountain of the Alps, in the country of the Grisons, runs north-east through Tyrol and Bavaria, and discharges itself into the Danube.

**INN**, or **INNER**, in the manege, is applied differently according as the horse works to the right or left, upon the volt; or as he works along by a wall, a hedge, or the like: for in moving by a wall, the leg next the wall is called the outer leg, and the other the inner leg: and upon volts, if a horse works to the right, the right heel is the inner heel, and the right leg the inner leg; but if he works to the left, the left heel is the inner heel, &c. At present, riding-masters, in order to be more easily understood, generally use the terms right and left, instead of outer and inner.

**INNATE IDEAS**, those supposed to be stamped on the mind, from the first moment of its existence, and which it constantly brings into the world with it: a doctrine, which Mr. Locke has abundantly refuted. See the article **IDEA**.

**INNERKEITHING**, a port-town of Scotland, in the county of Fife, situated on the north shore of the frith of Forth, ten miles north-west of Edinburgh.

**INNERLOCHY**, or **FORT WILLIAM**, a fortress erected in the highlands of Scotland, at the mouth of a bay or lake in the county of Lochaber, twenty-eight miles

miles south-west of Lochness: west lon.  $5^{\circ} 15'$ , and north lat.  $56^{\circ} 55'$ .

**INNISKILLING**, a strong town of Ireland, in the province of Ulster, and county of Fermanagh: west lon.  $7^{\circ} 50'$ , and north lat.  $54^{\circ} 20'$ .

**INNOCENTS-DAY**, a festival of the christian church, observed on December 28, in memory of the massacre of the innocent children by the command of Herod, king of Judea; who being alarmed at hearing that an infant was born king of the Jews, and imagining that his own kingdom was in danger, sent orders to have all the children slain that were in Bethlehem, and the adjacent country. The greek church in their calendar, and the abyssinians of Ethiopia in their offices, commemorate fourteen thousand infants on this occasion.

**INNOMINATA OSSA**, in anatomy, three bones, which compose the extreme part of the trunk of a human body. These, though single in adults, are in infants three perfectly distinct bones, each of which has its peculiar name; the upper one is called the ileum; the anterior one, the os pubis, or os pectinis; and the posterior one, the os ischium. These are joined by the intervention of a cartilage, as it were in the middle of that singular cavity called the acetabulum, and continue visibly distinct to the age of puberty; after which they coalesce, and form one entire bone so perfectly, that there is not the least vestige remaining that they ever were separate. The innominata ossa are joined on each side, in the hinder part, to the os sacrum, by ligaments and cartilages, and form a very firm and strong, though somewhat moveable articulation with it; and with this bone they also form the cavity called the pelvis; they also cohere with the os sacrum on each side, by means of two peculiar and very robust ligaments, each being a finger's breadth broad, and two or three finger's breadth long.

The use of these bones are to support and sustain the spina dorsi, and indeed all the parts above themselves; to make a firm and proper juncture of the other parts of the body with the thighs; to serve for the place of origin to several muscles; to form the cavity of the pelvis, and to defend its contents from external injuries.

**INNOVATION, or NOVATION.** See the article NOVATION.

**INNUENDO**, a word that was frequently used in declarations of slander, and law-

pleadings, when these were in latin, in order to ascertain a person or thing before mentioned; but now, instead of the word innuendo, we say, meaning so and so.

The practice of stretching innuendos, it is observed, has of late years, in some particular cases, too much prevailed amongst us: however, it has been held, that an innuendo cannot make that certain which was uncertain before; nor will the law allow words to be enlarged by an innuendo, so as to support an action on the case for uttering them. In slander, the person and words should both of them be distinctly specified, and not want an innuendo to make them out; and therefore an innuendo will not render an action for a libel good, where the preceding matter imports no scandal.

**INOCULATION**, in medicine, the art of transplanting a distemper from one subject to another, by incision, particularly used for engrafting the small pox. See the article POX.

The design of this operation is to communicate by art a milder species of the small pox to the infant or adult patient, than that received by the natural infection; and this by engrafting some of the variolous matter, in order to which a small incision is to be first made, with a scalpel or lancet, through the skin of the arm, and having inserted a small particle of the purulent matter, taken from a mild kind of the pox, the little wound is then to be dressed with some dry lint, and covered with a plaster. After the operation, the patient must constantly keep his chamber, the air of which should be moderately warm, and his diet regulated by some prudent physician, by which means this disorder will shew itself in seven or eight days, without any malignant symptoms, and if assisted by a proper regimen, and a moderate warmth, it usually runs gently through its several stages. When the patient has once had the disorder this way, though ever so mild, it is certain from experience, that they never have it again; and therefore the opinion of those seems to be well grounded, who think that the propagation of the small pox by inoculation might be of general use and benefit to mankind, in preserving the lives of some, and the most important members of others, as the face, eyes, hearing, viscera, &c. History informs us, that the disorder was this way propagated many hundred years ago, among the Greeks, Turks, and Chinese,

Chinese, whereas it is but of late years that the European nations have come into it, among which the English seem to have approved and followed it most. The experiment succeeded so well in the hands of the British physicians, that king George I. countenanced the same in all his dominions, and from thence the practice prevailed with success in Germany, particularly in the dominions of Hanover.

It must, however, be confessed, that there were many, both among the French and English, who endeavoured to suppress and vilify the practice in their writings; but it is thought by Heister, that all their objections have been sufficiently answered and obviated by Dr. Jurin and other able physicians.

Heister declares himself of opinion, that so far from thinking the practice fatal or mischievous, he rather firmly believes it might, under a proper management, be of the greatest use and benefit to the lives and healths of mankind; for, as he judges, the small pox arise from a pestilential virus or matter lodged in the blood, from the very first day of the birth, which breaks out almost in every person, sooner or later, and the more early usually the better, as it is seldom we observe the pox favourable in those more advanced in years; so that the matter seems to multiply itself in the blood, and augment with the patient's age. If, therefore, the disorder be procured of a mild kind by this operation, and the blood cleared of its latent virus, while small in quantity, and the infant young, he doubts not but many might by this means be not only preserved from death, but even conducted safely through the several stages of the disease, without the insults of its most malignant symptoms. We are convinced from experience, as well as reason, that, the disorder which breaks out from a natural infection, is generally more severe and fatal than that produced by art; and no wonder it should be so, since in the last, the physician has the opportunity of choosing the most favourable season, and of preparing his patient before-hand, by a proper regimen, diet, and medicines.

In the Phil. Trans. vol. xlvii. we have a new method of inoculation, discovered by Mr. Brooke, and communicated by him, in a letter, read before the Royal Society, May 14, 1752, to Dr. Parsons, secretary to the society for foreign corre-

spondence, shewing by experiments, that the pock may be engrafted without making any incision, only by the application of a little lint impregnated with variolous matter, and confining it with an adhesive plaster. Mr. Brooke tried the experiment upon several patients, and always with success; the absorbent vessels, he believes, in young subjects especially, will always take in a sufficient quantity of the matter to contaminate the whole mass of the circulating fluids; and though the density of the pores, or scaly insipifications of the materia perspirabilis, in adults, may in some measure prevent the disorder from being communicated by contact, yet friction will easily remove that obstacle; for by this means the cuticle is made as thin as is required, and the warmth induced by friction will dilute the mouths of the absorbent vessels, and draw a moderate flux of juices to that part, so that they may take in a sufficient quantity of variolous matter, to bring on the disorder.

In the same volume of the Transactions, we have an extract of a letter to Dr. Maty, from Geneva, read June 18, following, concerning the introduction and success of inoculation in that city. Their first method of doing it was generally the same as is now practised in England, whence instructions were sent to Geneva, when they began to inoculate: yet three persons were inoculated in a new manner: these were blistered slightly by means of a small vesicatory applied to that part of the arm where the incision is usually made. The blister occasioned by this plaster was opened, and a pledgit, dipped in the pocky matter was applied to the excoriated part: some pocky matter was made use of, which was kept three weeks; and some that had even been kept four months, without any apparent difference in the effects from that which was fresh. The experience which they have hitherto had in Geneva, has suggested to them a conjecture, that the incision ought to have been made deeper, where the matter, which is used, has been kept some time. All who had been inoculated by that time at Geneva, had recovered; and the far greater part of them had but an inconsiderable number of pustules.

INOCULATION, or BUDDING, in gardening, is commonly practised upon all sorts of stone-fruit, as nectarines, peaches, apricots, plumbs, cherries, as also upon oranges and jasmines; and, indeed, this

is preferable to any sort of grafting for most sorts of fruit. The method of performing it is as follows: you must be provided with a sharp penknife with a flat haft, which is to raise the bark of the stock to admit the bud; and some found bals-mat, which should be soaked in water, to increase its strength, and render it more pliable; then having taken off the cuttings from the trees you would propagate, you must choose a smooth part of the stock about five or six inches above the surface of the ground, if designed for dwarfs; but if for standards, they should be budded six feet above ground. Then with your knife make an horizontal cut across the rind of the stock, and from the middle of that cut make a slit downwards, about two inches in length, so that it may be in the form of a T; but you must be careful not to cut too deep, lest you wound the stock; then having cut off the leaf from the bud, leaving the foot-stalk remaining, you should make a cross cut, about half an inch below the eye, and with your knife slit off the bud, with part of the wood to it: this done, you must with your knife pull off that part of the wood which was taken with the bud, observing whether the eye of the bud be left to it or not; for all those buds which lose their eyes in stripping, are good for nothing: then having gently raised the bark of the stock with the flat haft of your penknife clear to the wood, thrust the bud therein, observing to place it smooth between the rind and wood of the stock, cutting off any part of the rind belonging to the bud, that may be too long for the slit made in the stock; and so having exactly fitted the bud to the stock, tie them closely round with bals-mat, beginning at the under part of the slit, and so proceeding to the top, taking care not to bind round the eye of the bud, which should be left open: When your buds have been inoculated three weeks or a month, those which are fresh and plump, you may be sure are joined; and at this time you should loosen the bandage, which if it be not done in time, will injure if not destroy the bud. The March following cut off the stock sloping, about three inches above the bud, and to what is left fasten the shoot which proceeds from the bud: but this must continue no longer than one year; after which the stock must be cut off close above the bud. The time

for inoculating is from the middle of June to the middle of August: but the most general rule is, when you observe the buds formed at the extremity of the same year's shoot, which is a sign of their having finished their spring growth. The first sort commonly inoculated is the apricot, and the last the orange-tree, which should never be done till the latter end of August. And in doing this work, you should always make choice of cloudy weather; for if it be done in the middle of the day, when the weather is hot, the shoots will perspire so fast, as to leave the buds destitute of moisture.

**INORDINATE PROPORTION**, is where there are three magnitudes in one rank, and three others proportional to them in another, and you compare them in a different order. Thus suppose the numbers in one rank to be 2, 3, 9; and those of the other rank 8, 24, 36; which are compared in a different order, *viz.* 2:3::24:36; and 3:9::8:24. Then rejecting the mean terms of each rank, you conclude 2:9::8:36.

**INOSULATION**, in anatomy, the same with anastomasis. See **ANASTOMASIS**.

**INQUEST**, in law, signifies an inquiry made by a jury, in a civil or criminal cause, by examining witnesses. See the article **JURY**.

There is also an inquest of office, used for the satisfaction of the judges, and sometimes to make inquiry whether a criminal be a lunatic or not; upon which inquest, if it be found that the criminal only feigns himself to be a lunatic, and at the same time refuses to plead, he may be dealt with as one standing mute. See the article **MUTE**.

Where a person is attainted of felony and escapes, and afterwards on being re-taken denies that he is the same man, inquest must be made into the identity of the person by a jury, before he can be executed.

**INQUIRENDO**, in law, an authority given to one or more persons, to inquire into something for the advantage of the king.

**INQUISITION**, in law, a manner of proceeding by way of search or examination used on the king's behalf, in cases of out-lawry, treason, felony, self-murder, &c. to discover lands, goods, and the like, forfeited to the crown. Inquisition is also had upon extents of lands, tenements, &c. writs of elegit, and where

where judgment being had by default, damages and costs are recovered.

**INQUISITION**, in the church of Rome, a tribunal in several roman-catholic countries, erected by the popes for the examination and punishment of heretics.

This court was founded in the twelfth century by father Dominic and his followers, who were sent by pope Innocent III. with orders to excite the catholic princes and people to extirpate heretics, to search into their number and quality, and to transmit a faithful account thereof to Rome. Hence they were called inquisitors; and this gave birth to the formidable tribunal of the inquisition, which was received in all Italy, and the dominions of Spain, except the kingdom of Naples and the Low Countries.

This diabolical tribunal takes cognizance of heresy, judaism, mahometanism, sodomy, and polygamy; and the people stand in so much fear of it, that parents deliver up their children, husbands their wives, and masters their servants, to its officers, without daring in the least to murmur. The prisoners are kept for a long time, till they themselves turn their own accusers, and declare the cause of their imprisonment; for they are neither told their crime, nor confronted with witnesses. As soon as they are imprisoned their friends go into mourning, and speak of them as dead, not daring to solicit their pardon, lest they should be brought in as accomplices. When there is no shadow of proof against the pretended criminal, he is discharged, after suffering the most cruel tortures, a tedious and dreadful imprisonment, and the loss of the greatest part of his effects. The sentence against the prisoners is pronounced publicly, and with extraordinary solemnity. In Portugal they erect a theatre capable of holding three thousand persons, in which they place a rich altar, and raise seats on each side in the form of an amphitheatre. There the prisoners are placed, and over-against them is a high chair, whither they are called, one by one, to hear their doom, from one of the inquisitors.

These unhappy people know what they are to suffer, by the cloaths they wear that day. Those who appear in their own cloaths, are discharged upon payment of a fine; those who have a *santo benito*, or strait yellow coat without sleeves, charged with St. Andrew's cross,

have their lives, but forfeit all their effects: those who have the resemblance of flames, made of red serge, sewed upon their *santo benito*, without any cross, are pardoned, but threatened to be burnt if ever they relapse: but those who, besides these flames, have on their *santo benito*, their own picture, surrounded with figures of devils, are condemned to expire in the flames. The inquisitors, who are ecclesiastics, do not pronounce the sentence of death; but form and read an act, in which they say, that the criminal being convicted of such a crime, by his own confession, is with much reluctance delivered to the secular power to be punished according to his demerits: and this writing they give to the seven judges, who attend at the right side of the altar, who immediately pass sentence. For the conclusion of this horrid scene, see the article *ACT of faith*.

**INQUISITORS**, in law, persons who have power by their office to make inquiry in certain cases; as sheriffs, and coroners on view of the body, &c.

**INROLLMENT**, in law, is registering any lawful act, as a statute or recognizance acknowledged, a deed of bargain and sale, &c. in the rolls of chancery, king's bench, common pleas, or exchequer, at the hustings of Guildhall, London, or at the quarter-sessions.

Inrollments of deeds must be recorded in court, and for the sake of perpetuity ingrossed on parchment: yet it is said that inrolling a deed does not make it a record, which is an entry on parchment of judicial matters controverted in a court of record; and of which the court is to take notice: but the inrollment of a deed, is only a private act of the parties concerned, of which the court takes no notice at the time when it is done, tho' the court gives way and accedes to it. All deeds may be inrolled at common law, and tho' by accident a seal is broke off, it will not hinder it. A deed when inrolled must be acknowledged before a master in chancery, or a judge of the court where it is inrolled; which being the officer's warrant for its inrollment, such inrollment will be allowed as good proof of the existence of the deed itself.

*Clerk of INROLLMENTS.* See the article *CLERK of inrollments*.

**INSCONCED**, in the military art, part of an army that have fortified themselves with a sconce or small fort, in order to defend some pass, &c.

**INSCRIBED**,



**INSCRIBED**, in geometry. A figure is said to be inscribed in another, when all its angles touch the sides or planes of the other figure. See the articles **HEXAGON**, **PENTAGON**, &c.

**INSCRIPTION**, a title or writing carved, engraved, or affixed to any thing, to give a more distinct knowledge of it, or to transmit some important truth to posterity.

The inscriptions mentioned by Herodotus and Diodorus Siculus, sufficiently shew that this was the first method of conveying instruction to mankind, and transmitting the knowledge of history and sciences to posterity: thus the antients engraved upon pillars both the principles of sciences, and the history of the world. Pisistratus carved precepts of husbandry on pillars of stone; and the treaties of confederacy between the Romans and Jews, were engraved on plates of brass. Hence, antiquarians have been very curious in examining the inscriptions on antient ruins, coins, medals, &c.

**INSECTS**, in zoology, a numerous class of animals, whose bodies are neither regularly covered with hair, feathers, or scales, as in the generality of other animals; but either with a hard, and as it were horny substance, or with a soft and tender skin; and of which the far greater part, that is, all the insects with a hard covering to their bodies, have on their heads antennæ, otherwise called horns and feelers.

The most general sub-division of insects is into two series, *viz.* the winged and naked ones; each of which comprehends several subordinate orders of genera, each containing numerous species.

The several orders of the first series are the coleoptera, hemiptera, neuroptera, lepidoptera, hymenoptera, and diptera; and those of the second series, are the aptera, reptilia, zoophyta, testacea, and lithophyta: of all which we have treated under their respective articles. See the articles **COLEOPTERA**, **HEMIPTERA**, **NEUROPTERA**, &c.

**Generation of INSECTS.** See the article **GENERATION**.

**Transformation of INSECTS.** See the article **TRANSFORMATION**.

**INSERTION**, in anatomy, the close conjunction of the vessels, tendons, fibres, and membranes of the body with some other parts. See the articles **TENDON**, **MUSCLE**, &c.

**INSIDIANT DISEASES**, those which shew no evident symptom, but lie concealed in the body, ready to break forth on the least provocation, as it were by surprise.

**INSINUATION**, in our law, a clandestine creeping into a person's mind, or favour; but, among the civilians, it bears a different signification; as the insinuation of a will is the first production of it, *viz.* the leaving it in the hands of the register, in order to the procuring a probate thereof.

**INSIPID**, an appellation given to things without taste. See the article **TASTE**.

**INSITION**, in gardening, the same with grafting. See the article **GRAFTING**.

**INSOLATION**, in chemistry, the suffering matters to stand and digest in the heat of the sun, instead of that of a furnace. See **FIRE** and **HEAT**.

**INSOLVENT**, a term applied to persons unable to pay their debts. See the articles **DEBT** and **DEBTOR**.

**INSPICIENDO VENTRE**, in law. See the article **VENTRE**.

**INSPIRATION**, among divines, implies the conveying of certain extraordinary and supernatural notices or motions into the soul.

In discoursing upon the argument concerning the inspiration of the scripture, the learned Du Pin alledges the testimony of the Jews, the authority of our Saviour and his apostles, and the universal consent of the christian church.

1. It cannot be in the least doubted, but that the antient Jews were thoroughly persuaded that the books in their canon were written by prophets divinely inspired: they looked upon the law of Moses as the law of God himself, and on the pentateuch as the foundation of their religion: they had even the evidence of their senses, that Moses was sent by God, that he conversed familiarly with him, and was assisted by him in an extraordinary manner; witness the many miracles which God wrought by him, and his divine providence and protection being vouchsafed to him in an unusual manner; so that, upon the whole, they had all imaginable evidence that the laws and historical narrations of Moses were all of them penned by inspiration from heaven. As to the other canonical books collected by Ezra, it cannot be questioned, with any colour of reason, but that Ezra, in drawing up his canon and sacred books, made choice of those which had the character of divinely in-

spired writings, and had been always acknowledged as such by the universal consent of the jewish nation ; and the synagogue looked upon this canonical system as prophetic and divinely inspired. See **CANON** and **BIBLE**.

2. From the unexceptionable testimony of the Jews, M. Du Pin proceeds to alledge the authority of our Saviour and his apostles. It is upon the evidence of these books that our Saviour proves himself to be the messias, and by them that he confutes the Jews. The apostles followed their master's doctrine in this as well as in all other things : these books they made use of to authorise the gospel they preached, and to prove that the prophecies concerning the messias, were fulfilled in the person of Jesus Christ.

3. From these authorities he proceeds to the testimony of the primitive church : those who were instructed by our Saviour and his apostles, had not only the same regard for the books of the Old Testament as the Jews themselves had, but likewise by universal consent received the gospels and epistles of the apostles as writings penned by the inspiration of the holy ghost. The primitive christians being fully persuaded of this truth, received the apostles doctrine with intire submission, and looked upon it as no other than the instruction of Jesus Christ and of God himself. See the article **CHRISTIAN RELIGION**.

**INSPISSATING**, in pharmacy, an operation whereby a liquor is brought to a thicker consistence, by evaporating the thicker parts. See **INCRASSATING**.

**INSPRUCK**, a city of Germany, in the circle of Austria, capital of the county of Tyrol, situated on the river Inn, in east long.  $11^{\circ} 26'$ , north lat.  $47^{\circ} 12'$ .

**INSTALLMENT**, the instating or establishing a person in some dignity.

This word is chiefly used for the induction of a dean, prebendary, or other ecclesiastical dignitary, into the possession of his stall, or other proper seat in the cathedral to which he belongs. It is also used for the ceremony whereby the knights of the garter are placed in their rank in the chapel of St. George at Windsor, and on many other like occasions. It is sometimes termed installation. See **GARIER**.

**INSTANT**, such a part of duration wherein we perceive no succession ; or it is that which takes up the time only of one idea in our minds.

The schoolmen distinguish three kinds of instants ; a temporary, a natural, and a rational instant.

Temporary instant is a part of time immediately preceding another : thus the last instant of a day precedes, immediately and really, the first instant of the following day.

Natural instant is what we otherwise call a priority of nature, which obtains in things that are subordinated in acting, as first and second causes, or causes and their effects : for the nature of things requires, that if there be a second cause there must be a first ; and that there must be a cause, if there be an effect. See the article **CAUSE**.

Rational instant is not any real instant, but a point which the understanding conceives to have been before some other instant, founded on the nature of the thing which occasioned it to be conceived : for instance, if God made several things voluntarily, which he could otherwise have let alone, there is a reasonable foundation to conceive God such as he is in himself, before he had made any of these voluntary determinations : but as there was no real instant when God had not formed any determination, this instant is called a rational instant, by way of opposition to an instant of time.

**INSTAURATION**, the re-establishment or restauration of a religion, a church, or the like, to its former state.

**INSTEP**, in the manege, is that part of a horse's hind leg which reaches from the ham to the pattern-joint ; and which, when the horse is in his natural posture of standing, should be large, flat, and in a perpendicular line with the ground : for when the insteps do not stand perpendicularly, it is a certain sign of weakness either in the reins or hinder quarters.

**INSTINCT**, an appellation given to the sagacity and natural inclinations of brutes, which supplies the place of reason in mankind. See **REASON** and **BRUTE**.

**INSTITUTES**, in literary history, a book containing the elements of the roman law, and constitutes the last part of the civil-law. See **CIVIL-LAW**.

The institutes are divided into four books, and contain an abridgment of the whole body of the civil-law ; being designed for the use of students.

**INSTITUTION**, in general, signifies the establishing or founding something.

In the canon and common law, it signifies

fies the investing a clerk with the spiritualities of a rectory, &c. which is done by the bishop, who uses the formula, "I institute you rector of such a church, with cure of souls, and receive your care and mine." This makes him a complete parson as to spirituality, but not as to temporality, which depends on induction. See the article **INDUCTION**. The term institutions is also used, in a literary sense, for a book containing the elements of any art or science: such are institutions of medicine, institutions of rhetoric, &c.

**INSTRUCTIVE COLUMN**, in architecture. See the article **COLUMN**.

**INSTRUMENT**, in general, whatever is subservient to a cause in producing any effect. See **CAUSE** and **EFFECT**.

A common case of mathematical instruments contains several compasses, a sector, scale, drawing-pen, and protractor. See the articles **COMPASSES**, **SECTOR**, **SCALE**, &c.

A case of pocket instruments for surgeons, which they ought always to carry about with them, contains lancets of different sizes; scissars, fit for several uses; forceps, plain and furnished with teeth; incision-knives, straight and crooked; a spatula, probes, needles, &c. See the articles **LANCET**, **SCISSARS**, **FORCEPS**, &c.

The following instruments used by surgeons, pay on their importation according to these rates. Trepanns, the dozen pay 1s. 11 $\frac{1}{10}$ d. and draw back on exportation, 1s. 8 $\frac{2}{10}$ d. Bullet-knives, the dozen, pay 9 $\frac{2}{10}$ d. and draw back 8 $\frac{1}{10}$ d. Incision-sheers, paices, or tooth-drawers and pulicanes, the dozen pay 11 $\frac{5}{10}$ d.

and draw back 10 $\frac{12\frac{1}{2}}{100}$ d. Setts, the bundle, containing sixteen, pay 4 $\frac{6\frac{2}{10}}{100}$ d. and draw back 4 $\frac{5}{100}$ d. More if made of iron, for every 112 pounds, 4s. 8 $\frac{2\frac{5}{10}}{100}$ d. and draw back 4s. 8 $\frac{2\frac{5}{10}}{100}$ d. if made of

steel, the 112 pounds pay 5s. 1 $\frac{8\frac{7}{10}}{100}$ d. the

whole of which is returned on exportation: but if they are made of silver, they are to pay as plate. See **PLATE**.

**INSTRUMENT**, in law, some public act, or authentic deed, by which any truth is made apparent, or any right or title established in a court of justice. See **DEED**.

**INSTRUMENTS**, in music, are either played on by means of wind, as the organ,

flute, hautboy, &c. or of strings, as the harpsichord, violin, &c. See the articles **ORGAN**, **FLUTE**, **HARPSICHORD**, &c.

**INSULATED**, *insulatus*, in architecture, an appellation given to such columns as stand alone, or free from any contiguous wall, &c. like an island in the sea; whence the name. See **COLUMN**.

**INSULT**, *insultus*, in medicine, signifies the access of the paroxysm of intermitting diseases. See the articles **INTERMITTING** and **PAROXYSM**.

**INSULT**, in the art of war, the same with assault. See the article **ASSAULT**.

**INSUPER**, over and above, a term used by the auditors of the exchequer in their accounts; thus, where a certain sum is charged to a person's account, they say, so much remains, insuper, to the accountant.

**INSURANCE**, or **ASSURANCE**, in law and commerce, a contract or agreement whereby one or more persons, called insurers, assurers, &c. oblige themselves to answer for the loss of a ship, house, goods, &c. in consideration of a premium paid by the proprietors of the things insured.

Insurances are of various kinds, as on ships or parts of ships, on merchandize singly, and on ships and goods jointly; and these are again branched out to run either for a time stipulated, or to one single port, or out and home, with liberty to touch at the different places mentioned in the policy. Insurances may likewise be made on goods sent by land, or by hoys, &c. on rivers; and this is frequently done, more especially on jewels, and other things of great value. They may likewise be made on ships and goods, lost or not lost, which is commonly done when a ship has been long missing; and those words being inserted in the policy, oblige the under-writers to pay, though the ship was lost at the time of making such insurance, except the assured had then certain knowledge of the ship's being wrecked; in which case the subscription shall not oblige, as this is accounted a mere fraud. So likewise if a person get more insured than the ship is worth, with a villanous design to destroy her, this fraudulent act will not oblige the insurers, but expose the proprietors to suffer death for their knavery. If a ship is insured from the port of London to any foreign port, and before she breaks ground is burnt, the insurers are not liable; unless the words of the in-

insurance are, at and from the port of London; but if she has once broke ground, and after being driven back, takes fire, the insurers are answerable. An insurance made on prohibited goods is not binding, unless they were not prohibited till after the insurance was made. Where the policy expressly mentions that the ship is to depart with convoy, it is intended that she shall, if possible, keep with the convoy during the voyage, and if she depart wilfully from the convoy, it is a fraud; but if having departed with convoy, she by stress of weather loses the convoy, and is taken, the insurers are liable. If there be thieves on board among themselves, the master of the ship is to answer for that, and not the insurers; for tho' the words of the policy insure against losses by thieves, yet assailing thieves are only here intended. An insurance made in a foreign country, may be sued in England by the common law, if the insurers come here. Where the policy is against restraint of princes, that does not extend to a navigation carried on against the law of nations, or where there shall be a seizure for not paying of customs, or the like. If goods be insured as the goods of an ally, when they are the goods of an enemy, it is a fraud, and the insurance not good. If a man pays money on a policy of insurance, supposing a loss where there was none, this shall be money received for the use of the insurer, for which he may maintain an action. Damages happening to goods in their own nature perishable, are not to be borne by the insurer. A suppression of the truth, or a false allegation, is sufficient to discharge the policy; for it is a general rule, that the insured ought to inform the insurer of all material circumstances that were come to his knowledge, at the time of making the policy, in order that the contract may be fairly adjusted; which being a contract upon chance, cannot be done, if one party knows more than the other; for equality in contracts, by the law-merchant, is essential; but a proof of an intention to make a deviation, will not avoid the policy before the deviation is actually made.

By an act made in 19 Geo. II. it is determined, that after the first day of August, 1746, no assurance shall be made on ships or lading by way of gaming or wagering, or without benefit of salvage to the insurer: that it shall

not be lawful to make re-assurance, unless the assurer shall become insolvent, become a bankrupt, or die; in which cases such assurer, or his executors, &c. may make re-assurance to the amount of the sum before assured, provided it be expressed in the policy to be a re-assurance. That all sums of money lent on bottomry or at respondentia, upon any ships belonging to his majesty's subjects, bound to or from the East Indies, shall be lent only on the ship or merchandize, laden, or to be laden, on board such ship, and shall be so expressed in the condition of the bond; and the benefit of salvage shall be allowed to the lender, his agents or assigns, who alone shall have a right to make assurance on the money so lent; and no borrower of money on bottomry, &c. shall recover more on any assurance, than the value of his interest in the ship or merchandize, exclusively of the money so borrowed; and in case it shall appear, that the value of his share in the ship or merchandize does not amount to the full sum borrowed, such borrower shall be responsible to the lender for so much of the money borrowed, as he hath not laid out on the ship or merchandize, with lawful interest for the same, together with the insurance and all other charges, to the proportion which the money not laid out shall bear to the whole money lent, notwithstanding the ship and merchandize be totally lost.

Whenever advice is received of the loss of a ship or goods insured, application is to be made to the insurers, and the vouchers produced; and if they are satisfied they will pay the money; but if they have cause to scruple the doing it, the insured must stay till the insurers can obtain a more satisfactory account; but if nothing be heard of the ship in any reasonable time, the insurers will be obliged to pay the money agreed upon. The policies made of insurances are to be stamped within three days after the ship is insured, on the penalty of paying 100l.

The principal offices for the insurance of ships and merchandize in London, are the Royal-exchange assurance, and the London-assurance, both of which are established by act of parliament. These offices also insure houses and other buildings, goods, wares, and merchandize, from loss or damage by fire; and the former of them also assure lives.

The Royal-exchange insurance, on a brick

brick or stone building, insures any sum not exceeding 200*l.* at 5*s.* *per ann.* and any larger sum not exceeding 1000*l.* after the rate of 2*s.* 6*d.* *per cent.* *per ann.* Above 1000*l.* and not exceeding 2000*l.* at 3*s.* *per cent.* Above 2000*l.* and not exceeding 3000*l.* at 4*s.* *per cent.* On goods and merchandize, the property of the assured, within any brick or stone building, or on the goods and building together, this office insures any sum not exceeding 300*l.* for 7*s.* 6*d.* *per ann.* and larger sums after the rates above-mentioned: but timber or plaster-buildings, or goods or merchandize therein, pay 8*s.* *per ann.* for 200*l.* and after the rate of 4*s.* *per cent.* for any greater sum not exceeding 1000*l.* and 5*s.* *per cent.* for all insurances above 1000*l.* and not

exceeding 2000*l.* On a timber or plaster building with goods and merchandize together, any sum, not exceeding 300*l.* may be insured for 12*s.* *per ann.* and larger sums at the above rates. The goods belonging to hazardous trades, as distillers, chemists, apothecaries, colourmen, tallow-chandlers, oilmen, innholders, &c. deposited in brick houses, pay 8*s.* *per ann.* for insuring 200*l.* and after the rate of 4*s.* *per cent.* for any greater sum not exceeding 1000*l.*; and above 1000*l.* and not exceeding 2000*l.* 5*s.* *per cent.* but when the houses and goods are put together, the price of insurance is 4*s.* *per cent.* *per ann.* without any other charge except the policies.

The London insurance has the following annual premiums.

Sums assured.	Common insurances.	Hazardous insurances.	Double hazardous insurances.
Any sum			
Not exceeding 200 <i>l.</i>	4 <i>s.</i> <i>per annum.</i>	6 <i>s.</i> <i>per annum.</i>	10 <i>s.</i> <i>per annum.</i>
From 200 <i>l.</i> to 1000 <i>l.</i>	2 <i>s.</i> <i>per cent.</i>	3 <i>s.</i> <i>per cent.</i>	5 <i>s.</i> <i>per cent.</i>
From 1000 <i>l.</i> to 2000 <i>l.</i>	2 <i>s.</i> 6 <i>d.</i> <i>per ct.</i>	4 <i>s.</i> <i>per cent.</i>	7 <i>s.</i> 6 <i>d.</i> <i>per ct.</i>
From 2000 <i>l.</i> to 3000 <i>l.</i>	4 <i>s.</i> <i>per cent.</i>	6 <i>s.</i> <i>per cent.</i>	7 <i>s.</i> 6 <i>d.</i> <i>per ct.</i>

The hand-in-hand office insure for seven years at 12*s.* *per cent.* on brick, and double that sum for timber-houses.

The sun-fire office, besides 7*s.* 6*d.* for the policy and mark, has the following annual premiums.

Sums insured.	Common insurances.	Hazardous insurances.	Double hazardous insurances.
Any sum			
Not exceeding 200 <i>l.</i>	4 <i>s.</i> <i>per annum.</i>	6 <i>s.</i> <i>per annum.</i>	10 <i>s.</i> <i>per annum.</i>
From 200 <i>l.</i> to 1000 <i>l.</i>	2 <i>s.</i> <i>per cent.</i>	3 <i>s.</i> <i>per cent.</i>	5 <i>s.</i> <i>per cent.</i>
From 1000 <i>l.</i> to 2000 <i>l.</i>	2 <i>s.</i> 6 <i>d.</i> <i>per ct.</i>	4 <i>s.</i> <i>per cent.</i>	7 <i>s.</i> 6 <i>d.</i> <i>per ct.</i>
From 2000 <i>l.</i> to 3000 <i>l.</i>	3 <i>s.</i> 6 <i>d.</i> <i>per ct.</i>	5 <i>s.</i> <i>per cent.</i>	7 <i>s.</i> 6 <i>d.</i> <i>per ct.</i>

The friendly society insurance, has some very extraordinary regulations, the principal of which is, that every one of the assured becomes a member of the society; and when any loss happens, contributes in proportion to the sum he has insured, to make good the damage; on which account he pays only 1*s.* 4*d.* *per cent.* *per ann.* premium, and 6*s.* 8*d.* *per cent.* as a caution; but what is unexpended of the 6*s.* 8*d.* is returned to the party insured at the end of seven years.

We have also insurances for lives, in virtue of which, when the person insured dies, a sum of money becomes payable to the person on whose behalf the policy of insurance was granted. The principal insurance office of this kind, is that of the amicable society for a perpetual

assurance, kept in Serjeant's inn, Fleetstreet, London.

In this office, after paying the charges of the policy, and 10*s.* entrance-money, each person pays 5*l.* *per annum*, by quarterly payments, and from these payments, the dividends, which usually amount to 100*l.* and upwards, are to arise. All persons admitted are to be between the ages of twelve and forty-five, and in a good state of health. Any person is allowed to have two or three insurances or numbers on the same life, whereby such person will be intitled to a claim on each number so insured; and every claimant is empowered to put in a new life, in the room of one deceased, within twelve kalendar months next after the end of the current year. By becoming

coming members of this society, clergymen, physicians, lawyers, tradesmen, and all whose income ceases at the time of their death, may, in all probability, leave to their families a claim of not less than 100*l.* for every 5*l.* annually paid in.

The value of insurances upon lives, depends upon the probability of the continuance of any proposed life or lives, during any proposed term. Any questions of this kind may be determined from Dr. Halley's table, and from the principles of the Doctrine of Chances. But, as far as we can learn of the practice on such occasions, the premiums paid to insurers are generally higher than any computation founded on observations concerning the probabilities of human life, will warrant. Thus it is not unusual to make a person pay 5 *per cent.* for the insurance of his life for a twelvemonth, that is, in case the person dies within the year, the insurer is to pay 100*l.* for every 5*l.* received. Now it appears from Dr. Halley's table, which estimates the probability of life low enough, that 5 *per cent.* is an adequate value only for a life of an advanced age, such as sixty-four. See the article LIFE.

**INTACTÆ**, in conics, an appellation sometimes given to the asymptotes. See the article ASYMPTOTES.

**INTAGLIOS**, precious stones on which are engraved the heads of great men, inscriptions, and the like; such as we frequently see set in rings, seals, &c.

**INTAKERS**, a sort of robbers in the north of England, who formerly received the booty which their confederates the out partners, brought from the borders of Scotland.

**INTEGER**, in arithmetic, a whole number, in contradistinction to a fraction. See NUMBER and FRACTION.

**INTEGRAL**, or **INTEGRANT**, in philosophy, appellations given to parts of bodies which are of a similar nature with the whole: thus filings of iron have the same nature and properties as bars of iron.

Bodies may be reduced into their integrant parts by triture or grinding, limation or filing, solution, amalgamation, &c. See GRINDING, &c.

**INTENDMENT**, in law, is the intention, design, or true meaning of a person or thing, which frequently supplies what is not fully expressed: but tho' the intent of

parties in deeds and contracts is much regarded by the law, yet it cannot take place against the rules of law.

**INTENDMENT of crimes**; this, in case of treason, where the intention is proved by circumstances, is punishable in the same manner as if it was put in execution. So if a person enter a house in the night-time, with an intent to commit burglary, it is felony; also an assault, with an intent to commit a robbery on the highway, is made felony, and punished with transportation. 7 Geo. II. c. 23.

**INTERCALARY**, *intercalaris*, in chronology, an appellation given to the odd day inserted in leap-year; which was so called from *calo*, *calare*, to proclaim, it being proclaimed by the priests with a loud voice. See the articles **BISSEXTILE** and **LEAP-YEAR**.

**INTERCEPTED AXIS**, in conic sections, the same with **ABSCISS**. See **ABSCISS**.

**INTERCESSION**, in roman antiquity, the act of a tribune of the people, or other magistrate, whereby he inhibited the act of another magistrate.

The tribunes had an unlimited power to interceed or controul the acts of every other magistrate, who could only inhibit the acts of inferior magistrates. See the article **TRIBUNE**.

**INTERCOLUMNIATION**, in architecture, denotes the space between two columns, which is always to be proportioned to the height and bulk of the columns.

Some authors have laid down the following proportions for the intercolumniations, at a medium, *viz.* in the tuscan order, it must be equal to four diameters of the column below; in the doric, to three; in the ionic, to two; in the corinthian, to two and a quarter; and in the composite, to one and an half.

**INTERCOMMONING**, in law, is when the commons of two manors lie together, and the inhabitants of both have, time out of mind, caused their cattle to feed promiscuously on them.

**INTERCOSTAL**, in anatomy, an appellation given to such muscles, nerves, arteries and veins as lie between the ribs. See the article **RIB**.

The intercostal muscles are thin fleshy plates, two between each two ribs, one external and the other internal. The intercostal nerves are branches of the fifth and sixth pair; the intercostal arteries are branches of the two subclavians; and the

the intercostal veins arise from the vena azygos. See the articles **MUSCLE**, **NERVE**, **ARTERY**, &c.

**INTERDICT**, an ecclesiastical censure, by which the church of Rome forbids the performance of divine service in a kingdom, province, town, &c. This censure has been frequently executed in France, Italy and Germany; and in the year 1170, pope Alexander III. put all England under an interdict, forbidding the clergy to perform any part of divine service, except baptizing of infants, taking confessions, and giving absolution to dying penitents. But this censure being liable to the ill consequences of promoting libertinism and a neglect of religion, the succeeding popes have very seldom made use of it.

There was also an interdict of persons, who were deprived of the benefit of attending on divine service. Particular persons were also antiently interdicted of fire and water, which signified a banishment for some particular offence: by this censure no person was allowed to receive them, or allow them fire or water; and being thus wholly deprived of the two necessary elements of life, they were doubtless under a kind of civil death.

**INTEREST**, is the premium or money paid for the loan or use of money; and is distinguished into two kinds, simple and compound.

Simple interest is that which is paid for the principal, or sum lent, at a certain rate or allowance made by law, or agreement of parties, whereby so much as 5*l.* or 6*l.* or any other sum, is paid for 100*l.* lent out for one year; and more or less proportionally for greater or lesser sums, and for more or less time. For example, if it is 5*l.* to 100*l.* for one year, it is 2*l.* 10*s.* for half a year, and 10*l.* for two years: also 10*l.* for one year of 200*l.* and 5*l.* for half a year; and so on, for other sums and times. Thus, as the law, or agreement of parties, fixes a certain ratio, or, as we call it, rate of interest, which is so much on the 100*l.* for one year; from this we can easily find the proportional interest on 1*l.* for one year, being plainly the  $\frac{1}{100}$  part of the interest of 100*l.* so if this is 5*l.* that is .05*l.* if this is 6*l.* that is .06*l.* and if this is 5*l.* 10*s.* or 5.5*l.* that is .055*l.* Wherefore, if we understand the rate of interest to be the interest of 1*l.* for one year, the more common questions about simple in-

terest will relate to these four things, viz. any principal sum, its interest, the time in which it gives that interest, and the rate, or interest of 1*l.* for one year, according to which that principal, interest and time are adjusted to one another.

From which we have four problems; in the rules whereof we suppose the principal and interest expressed in the denomination of pounds, by reducing what is less than 1*l.* to a decimal of 1*l.* and the time to be expressed in years, and decimal parts of one year.

**Prob. I.** Having any principal sum, and time, with the rates of interest given, to find the interest of that sum for that time and rate.

**Rule:** Multiply the principal rate and time continually into one another, the product is the interest sought.

Observe, if we express the principal by *p*, the interest by *i*, the time by *t*, and the rate by *r*, then this rule is thus represented,  $i = p t r$ .

**Example:** The rate of interest being .05*l.* what is the interest of 85*l.* for 4 years and 3 quarters, or 4.75 years?

**Answer.** 20*l.* 3*s.* 9*d.* = 20.1875*l.* = 85 × 4.75 × .05.

Which is thus performed:

$$\begin{array}{r} 85 = p \\ 4.75 = t \\ \hline 425 \\ 595 \\ \hline 340 \\ 403.75 \\ \hline .05 = r \\ \hline 20.1875 \text{ pounds.} \end{array}$$

Which decimal is reduced by multiplying it by 20, 12, and 4: thus,

$$\begin{array}{r} .1875 \\ \hline 20 \\ \hline 3.7500 \text{ shillings} \\ \hline 12 \\ \hline 15000 \\ \hline 4 \\ \hline 7500 \end{array}$$

9.0000 pence

**Prob. II.** Having the rate, principal and interest, to find the time.

**Rule:** Divide the interest by the product of the rate and principal, the quote is the time: thus,  $t = \frac{i}{rp}$ .

**Example:** The rate .05*l.* principal 85*l.* interest 20*l.* 3*s.* 9*d.* or 20.1875*l.* the time is 4.75 years, or 4  $\frac{3}{4}$  years.

Thus,  $4.75 = \frac{20.1875}{85 \times .05}$ , or  $\frac{20.1875}{4.25}$ .

Demonstration:

Demonstration: This rule is deduced from the former; thus, since  $n = trp$ , then dividing both sides by  $rp$ , it is  $\frac{n}{rp} = t$ .

Prob. III. Having the principal, interest, and time, to find the rate.

Rule: Divide the interest by the product of principal and time, the quote is the rate: thus,  $\frac{n}{tp} = r$ .

Example:  $n = 20.1875$  l.  $t = 4.75$  years,  $p = 85$  l. then is  $r = .05$  l.  $= \frac{20.1875}{4.75 \times 85}$ , or  $\frac{20.1875}{403.75}$ .

Demonstration: Since  $n = trp$ , divide both by  $tp$ ; it is  $\frac{n}{tp} = r$ .

Prob. IV. Having the rate, time and interest, to find the principal.

Rule: Divide the interest by the product of rate and time, the quote is the principal; thus,  $\frac{n}{tr} = p$ .

Example:  $n = 20.1875$  l.  $t = 4.75$  years,  $r = .05$  l. then is  $p = 85$  l.  $= \frac{20.1875}{4.75 \times .05}$ , or  $\frac{20.1875}{.2375}$ .

Demonstration: Since  $n = trp$ , divide both sides by  $tr$ , the quote is  $\frac{n}{tr} = p$ .

Scholium: If the interest of any sum for any time is added to the principal, this total or sum is called the amount, (*viz.* of the principal and its interest for that time.) And then from these four things, *viz.* the amount, which we call  $a$ , the principal, the time and rate, arise four problems; for having any three of these the fourth may always be found. Thus,

Prob. V. Having the principal, time and rate, to find the amount.

Rule: Find the interest by prob. I. add it to the principal, the sum is the amount. Thus, by prob. I. the interest is  $p tr$ ; therefore the amount is  $a = p tr + p$ . The reason is evident.

Note: Because  $p tr = rt \times p$ , and  $p = 1 \times p$ ; therefore  $rt p + p = rt + 1 \times p = a$ . And so the rule may be expressed thus; to the product of the rate and time add unity, and multiply the sum by the principal, the product is the amount.

Example: What is the amount of 246 l. principal in 2 years and  $\frac{1}{2}$ , or 2.5 years,

the rate of interest being .05 l? Answer 246 l. + 30.75 l. = 276 l. 15 s. for the interest is  $= 246 \times .05 \times 2.5 = 30.75$  l. Or thus;  $.05 \times 2.5 = .125$  l. to which add 1, it is  $1 + .125$  l. which multiplied by 276, produces 276.75 l.

Prob. VI. Given the principal, amount and time, to find the rate.

Rule: Take the difference betwixt the principal and amount, and divide it by the product of the time and principal, the quote is the rate: thus,  $r = \frac{a-p}{tp}$ .

Example: Suppose  $a = 276.75$  l.  $p = 246$ ,  $t = 2.5$  years; then is  $r = .05$  l.  $= \frac{276.75 - 246}{2.5 \times 246} = \frac{30.75}{615}$ .

Demonstration: Since by prob. V.  $a = trp + p$ , take  $p$  from both sides, it is  $a - p = trp$ ; then divide both by  $tp$ , it is  $\frac{a-p}{tp} = r$ .

Prob. VII. Given the amount, principal and rate, to find the time.

Rule: Take the difference of the amount and principal, and divide it by the product of the principal and rate, the quote is the time: thus  $t = \frac{a-p}{rp}$ .

Example: Suppose  $a = 276.75$  l.  $p = 246$  l.  $r = .05$ ; then is  $t = 2.5$  years  $= \frac{276.75 - 246}{246 \times .05} = \frac{30.75}{12.3}$ .

Demonstration: In the last problem,  $a - p$  was equal to  $trp$ ; and dividing both by  $rp$ , it is  $\frac{a-p}{rp} = t$ .

Prob. VIII. Given the amount, rate, and time, to find the principal.

Rule: Add 1 to the product of the rate and time, and by that sum divide the amount, the quote is the principal: thus,  $p = \frac{a}{rt+1}$ .

Example:  $a = 276.75$  l.  $r = .05$  l.  $t = 2.5$  years; then is  $p = 246 = \frac{276.75}{2.5 \times .05 + 1} = \frac{276.75}{1.125}$ .

Demonstration: By prob. V. it is  $a = rt + 1 \times p$ ; therefore dividing both sides by  $rt + 1$ , it is  $\frac{a}{rt+1} = p$ .

Compound INTEREST, is that which is paid for any principal sum, and the simple interest due upon it for any time, accumulated into one principal sum. Example:



ple: if 100l. is lent out for one year at 6l. and if at the end of that year the 6l. due of interest be added to the principal, and the sum 106l. be considered as a new principal bearing interest for the next year (or whatever less time it remains unpaid) this is called compound interest, because there is interest upon interest, which may go on by adding this second year's interest of 106l. to the principal 106l. and making the whole a principal for the next year.

Now, although it be not lawful to let out money at compound interest, yet in purchasing of annuities or pensions, &c. and taking leases in reversion, it is very usual to allow compound interest to the purchaser for his ready money; and, therefore, it is very necessary to understand it.

Let therefore, as before,  $p$  = the principal put to interest;  $t$  = the time of its continuance;  $a$  = the amount of the principal and interest;  $R$  = the amount of 1l. and its interest for one year, at any given rate, which may be thus found.

*Viz.* 100:106::1:1,06 = the amount of 1l. at 6 per cent. Or 100:105::1:1,05 = the amount of 1l. at 5 per cent. And so on, for any other assigned rate of interest.

Then if

$R$  = amount of 1l. for 1 year, at any rate.

$R^2$  = amount of 1l. for 2 years,

$R^3$  = amount of 1l. for 3 years,

$R^4$  = amount of 1l. for 4 years,

$R^5$  = amount of 1l. for 5 years,

Here  $t = 5$ . For 1:R::R:RR::RR:RRR::RRR:R<sup>4</sup>::R<sup>4</sup>:R<sup>5</sup>:&c. in a geometrical progression continued; that is, as 1l. is to the amount of 1l. at 1 year's end: so is that amount: to the amount of 1l. at 2 years end, &c. Whence it is plain, that compound interest is grounded upon a series of terms, increasing in geometrical proportion continued; wherein  $t$  (*viz.* the number of years) does always assign the index of the last and highest term, *viz.* the power of  $R$ , which is  $R^t$ .

Again, as 1:R<sup>t</sup>:: $p$ : $pR^t = a$  the amount of  $p$  for the time, that  $R^t$  = the amount of 1l. That is, as 1l. is to the amount of 1l. for any given time:: so is any proposed principal, or sum: to its amount for the same time.

From what has been said, we presume, the reason of the following theorems will be very easily understood.

Theorem I.  $pR^t = a$ , as above.

From hence the two following theorems are easily deduced.

Theorem II.  $\frac{a}{R^t} = p$ .

Theorem III.  $\frac{a}{p} = R^t$ .

By these three theorems, all questions about compound interest may be truly resolved by the pen only, *viz.* without tables: though not so readily as by the help of tables calculated on purpose.

Example I. What will 256l. 10s. amount to in 7 years, at 5 per cent. *per annum*, compound interest?

Here is given  $p = 256.5$ ,  $t = 7$ , and  $R = 1.05$ , which being involted until its index =  $t$  (*viz.* 7) will become  $R^7 = 1.40710$ . Then  $1.40710 \times 256.5 = 360.92115 = a = 360l. 18s. 5d.$  which is the answer required.

Example II. What principal or sum of money must be put out to raise a stock of 360l. 18s. 5d. in seven years, at 5 per cent. *per annum*, compound interest?

Here is given  $a = 360.92115$ ,  $R = 1.05$  and  $t = 7$  to find  $p$  by theorem II. Thus  $R^7 = 1.40710$  ( $360.92115 = a$ )  $256.5 = p$ . That is,  $p = 256l. 10s.$  which is the sum or principal required.

Example III. In what time will 256l. 10s. raise a stock of (or amount to) 360l. 18s. 5d. allowing 5 per cent. *per annum*, compound interest?

Here is given  $p = 256.5$ ,  $a = 360.92115$ ,  $R = 1.05$ . To find  $t$  by theorem III.

$R^t = \frac{a}{p} = \frac{360.92115}{256.5} = 1.40710$ , which

being continually divided by  $R = 1.05$  until nothing remain, the number of those divisions will be  $t = 7$ .

Thus 1.05)1.40710(1.3400, and 1.05) (1.3400)1.2762, and 1.05(1.2762)1.2155, and so on until it become 1.05)1.05(1. which will be at the seventh division.

Therefore it will be  $t = 7$ , the number of years required by the question.

Example IV. If 261. 10s. will amount to, or raise a stock of 360l. 18s. 5d. in 7 years time, what must the rate of interest be, *per cent. per annum*.

Here is given  $p = 261.5$ ,  $a = 360.92115$ , and  $t = 7$ ; quere  $R$ . By theorem III.

$\frac{a}{p} = R^t = 1.40710$ ; as before in the last

example. And if  $R^7 = 1.40710$ , then  $R = \sqrt[7]{1.40710}$ , which may be thus extracted.

10 S

Put

$$\begin{array}{l|l}
 \text{Put} & 1 \quad r + e = R, \text{ then} \\
 1 \odot 7 & 2 \quad r^7 + 7r^6e + 21r^5ee, \&c. = R^7 = 1.40710 = G \\
 2 - r^7 & 3 \quad 7r^6e + 21r^5ee, \&c. = G - r^7 \\
 3 \div 7r^5 & 4 \quad re + 3ee = \frac{G - r^7}{7r^5} = D \\
 4 \div r + 3e & 5 \quad e = \frac{D}{r + 3e}
 \end{array}$$

Let  $r = 1$ , then  $D = 0.0575$ .

$$\begin{array}{r}
 \text{Operation.} \quad r = 1.00 \quad 0.0575 \quad (0.05 \\
 \quad \quad \quad + 3e = .15 \quad 575 \\
 \text{Divisor } 1.15
 \end{array}$$

$$\begin{array}{l}
 \text{First } r = 1.00 \quad \} = 1.05 = R. \\
 \quad \quad \quad + e = 0.05 \quad \}
 \end{array}$$

Then  $1 : 0.05 :: 100 : 5$  the rate *per cent.* required.

**INTEREST**, in law, is generally taken for a chattel real, or a lease for years, &c. but more for a future term.

An estate in lands, &c. is better than a bare interest therein; yet, according to the legal sense of the word, an interest extends to estates and titles which a person has in or out of lands, &c. for by grant of a person's whole interest in land, a reversion, as well as possession, in simple fee, passes.

**INTERJECTION**, in grammar, an indeclinable part of speech, signifying some passion or emotion of the mind.

As the greatest part of the expressions used on these occasions are taken from nature alone, the real interjections, in most languages, are monosyllables; and as all nations agree in these natural passions, so do they agree in the signs and indications of them, as of love, mirth, &c.

The greeks confound their interjections with adverbs, and the hebrews confound them with their adverbs and prepositions, calling them all by the general name particle.

**INTERIM**, a name given to a formulary, or kind of confession of the articles of faith, obtruded upon the protestants after Luther's death by the emperor Charles V. when he had defeated their forces; so called because it was only to take place in the interim (mean time) till a general council should have decided all points in dispute between the protestants and the romanists. It retained most of the doctrines and ceremonies of the romanists, excepting that of marriage, which was allowed to priests, and communion to the laity under both kinds. Most of the protestants rejected it. There were two other interims, one of Leipzig, the other of Franconia.

**INTERLOCUTORY ORDER**, in law, an order that does not decide the cause, but only some matter incident thereto, which happens between the beginning and end of a cause; as when, in chancery or exchequer, the plaintiff obtains an order for an injunction until the hearing of the cause; which order, not being final, is called interlocutory.

**INTERLOPERS**, are properly those who, without due authority, hinder the trade of a company or corporation lawfully established, by dealing in the same way.

**INTERLUDE**, an entertainment exhibited on the theatre between the acts of a play, to amuse the spectators while the actors take breath and shift their dress, or to give time of changing the scenes and decorations.

In the ancient tragedy, the chorus sung the interludes, to shew the intervals between the acts. In after times, they made use of the pantomimes to relieve the audience, that they might not grow weary of the play; a practice which can never be mentioned to their honour: for it is certain evidence of a bad taste, when the audience cannot bear to sit out a dramatic entertainment, without being relieved by such low diversions. But we have not the least reason to wonder at this, who have seen, in our own time and nation, rope and ladder-dancers, and other notable artists of this class, not only admitted upon the stage, but received there with the utmost applause. Interludes now are generally songs, dances, or concerts of music. Aristotle and Horace give it for a rule, that interludes should consist of songs founded on the principal parts of the drama.

**INTERLUNUS MORBUS**, the same with the epilepsy. See **EPILEPSY**.

**INTERMEDIATE**, is usually understood of the space of time elapsed from any certain point to any other.

**INTERMEWING**, in falconry, is a hawk's mewwing, from the first change of her coat, till she turn white.

**INTERMITTENT**, or **INTERMITTING FEVERS**, such fevers as go off and soon return again, in opposition to those which

which are continual. See the article **FEVER**.

These fevers are distinguished into various classes, according to the interval of time between the relapse into them, as tertian fever, quartan fever, &c. See the articles **TERTIAN**, **QUARTAN**, &c.

It may be observed, that intermittents in general are either vernal, and rage from February till August; or autumnal, and rage from August to February. Fevers of this kind begin with an oscitation, pandiculation, weariness, weakness, cold, horror, rigor, tremor, and paleness of the extremities, a difficult respiration, an anxiety, a nausea, a vomiting, a quick, weak, and slow pulse. The more violent and numerous these symptoms are, the worse the fever is; and afterwards, the heat and other symptoms are the worse. This is the first stage of intermittent fevers, which corresponds to the increase of continual fevers, and is of all other stages the most dangerous: for in this condition, the urine is generally crude and thin. This stage of intermittent fevers is succeeded by another, which begins with heat, redness, a strong, large, and free respiration, a small anxiety, a large and strong pulse, an excessive thirst, a pain in the limbs and head, generally a redness of the urine: this stage corresponds to the state and height of continual fevers. Then last of all, there generally appears a profuse sweat, a remission of all the symptoms, a thick urine, with a sediment resembling black dust, sleep, a total absence of the fever, lassitude, and weakness.

Intermittent fevers frequently terminate in those of the acute and dangerous kind, which is generally owing to an excessive heat, and too brisk a motion of the fluids. The cure requires that we should use aperient, saline, alkaline, aromatic, mineral, diluting, mild, and oleaginous substances, heat, motion, fomentation, and friction, during the intermission, or in the first stage; the medicines of this kind are all Tachenius's salts of herbs: the most considerable of which are obtained from wormwood, *carduus benedictus*, and stalks of beans, nitre, antimoniated nitre, diaphoretic antimony unwashed, sal ammoniac, sal prunella, and sal polychrestus, tartarus regeneratus, tartarus tartarizatus, salt of tartar, reduced to a saponaceous mass with oil of turpentine, and all the parts of all the aromatic herbs, especially of those which are re-

solvent. In order to purge the *primæ viæ* from the redundant sordes, a purge or a vomit is often beneficial, exhibited so long before the paroxysm that its operation may be over before the fit comes on. That an intermitting fever, says Dr. Mead, is not carried off by the peruvian bark with a proper degree of certainty, without promising a vomit, or a purge, or both, is not unknown to physicians; but to join some mild cathartic to this remedy will perhaps appear new in practice. For it is commonly thought among us, that this medicine has little or no effect, unless the patient be costive while he takes it; but long experience has taught me, continues the doctor, that it is quite necessary to add a small quantity of rhubarb to this febrifuge, so as to procure two stools at least every day; nor have I ever observed that this procedure has lessened its virtue, but rather rendered it more efficacious.

However, the doctor observes, that it sometimes happens that this febrifuge fails in true intermittents, which failure he ascribes generally to a bad habit of body, in which case the physician should use his best endeavours to discover in what part the fault lies; and it will be commonly found to be in the viscera and glands of the abdomen. Upon this account, he thinks it necessary to prescribe some purges, and sometimes vomits; and in the intermediate days, deobstruents and stomachics; the best of which are aromatic bitters, and preparations of steel.

**INTERNAL**, in general, signifies whatever is within a thing.

Euclid (lib. 1. prop. 32.) proves, that the sum of the three angles of every triangle is equal to two right angles; whence he deduces several useful corollaries. See the article **TRIANGLE**.

He likewise deduces, from the same proposition, this theorem, *viz.* that the sum of the angles of every rectilinear figure, is equal to twice as many right angles, as the figure hath sides, excepting or subtracting four.

**INTERNODIUM**, among botanists, denotes the space between two knots or joints of the stalks of barley, oats, and the like plants.

**INTEROSSEUS**, in anatomy, an appellation given to the muscles which move the fingers and toes, from their being situated between the bones of those parts. See the articles **MUSCLE**, **FLEXOR**, &c.

**INTERPOLATION**, among critics, denotes a spurious passage, inserted into the writings of some ancient author.

One great rule with regard to the expunging interpolations, is, that the restitution be perfectly agreeable to the rest of the work.

**INTERPRETER**, in general, denotes a person who explains the words or writings of another, so as to make them intelligible to those who did not understand them before.

**INTERREGNUM**, the time during which the throne is vacant, in elective kingdoms; for in such as are hereditary, like ours, there is no such thing as an interregnum.

**INTERREX**, the magistrate who governs during an interregnum.

In ancient Rome, this magistrate was continued even after the expulsion of their kings.

**INTERMENT**, the act of burying the dead. See the article **BURIAL**.

**INTERROGATION**, or *point of INTERROGATION*, in grammar, a character of this form (?) serving to denote a question.

**INTERROGATION**, in rhetoric, is a figure, whereby the orator proposes something by way of question; which, it must be owned, greatly enlivens the discourse.

**INTERROGATORIES**, in law, are questions wrote down, and demanded of the witnesses examined in a cause, more especially in the court of chancery. These interrogatories must relate only to the necessary point, and be either drawn up or perused, and also signed by counsel: but care must be taken, that they are not calculated to lead a person in what he has to say, by putting words as it were into his mouth, as, did you not see such a thing done? the depositions taken upon such interrogatories will be suppressed; for they ought not to lean to one side more than another, and therefore should be expressed after this manner, did you see or not see? The examiners, and also the commissioners who examine the witnesses produced on interrogatories, must examine only one interrogatory at a time, and not ask any idle questions, or set down impertinent answers.

**INTERRUPTION**, in matters of proportion, signifies the same with disjunction, or disjunct proportion. See the article **DISCRETE**.

Interruption is noted thus, (:) and intimates the breaking off the ratio in the middle of four disjunct or discrete pro-

portionals; as,  $A : B :: C : D$ , that is as  $A$  is to  $B$ , so is  $C$  to  $D$ . See the articles **PROPORTION**, **RATIO**, &c.

**INTERRUPTION** is likewise a figure in rhetoric, wherein a person, to shew his passion, breaks off his discourse suddenly and abruptly.

**INTERSECTION**, in the mathematics, signifies the cutting of one line or plane by another: thus, we say, that the mutual intersection of two planes is a right line. See **LINE** and **PLANE**.

**INTERSOILING**, in husbandry, is laying one kind of soil or mould upon another, as clay on sand, sand on earth, &c.

**INTERSPINALES colli**, in anatomy, small fleshy muscles of the neck, arising from the superior parts of each double spinal process of the neck, except of the second vertebra; and inserted into the inferior parts of all the double spines. When these muscles act, they draw the spines of the vertebrae of the neck nearer each other.

**INTERSTELLAR**, a word used by some authors to express those parts of the universe that are without and beyond our solar system.

In the interstellar regions are supposed to be several other planetary systems moving round each fixed star as the center of their motion, as the sun is that of ours. And if it be true, as is not improbable, that each fixed star may be thus a sun to some habitable orbs that may move round it, the interstellar world will be infinitely the greater part of the universe.

**INTERTIES**, in architecture, those small pieces of timber that lie horizontally between the sommers, or between them and the fell, or refon.

**INTERTRANSVERSALES colli**, in anatomy, certain muscles situated among the transverse apophyses of the vertebrae: they arise from the lower vertebra, and are inserted into that next above: they are of the same size and figure with the interspinales.

**INTERVAL**, in music, the difference between two sounds, in respect of acute and grave; or, that imaginary space terminated by two sounds, differing in acuteness or gravity.

When two or more sounds are compared in this relation, they are either equal or unequal in the degree of time: such as are equal are called unisons, with regard to each other, as having one tune; the other, being at a distance from each other, constitute what we call an interval in music.

music ; which is properly the distance in time between two sounds.

Intervals are distinguished into simple and compound.

A simple interval, is without parts or divisions. Such are the octave, and all that are within it ; as the second, third,

fourth, fifth, sixth, and seventh, with their varieties.

A compound interval, consists of several lesser intervals : such are all those greater than the octave ; as the ninth, tenth, eleventh, twelfth, &c. with their varieties.

Table of intervals, simple and compound.

1	2	3	4	5	6	7	Simple
8	9	10	11	12	13	14	Double
15	16	17	18	19	20	21	Triple
22	23	24	25	26	27	28	Quadruple
29	30	31					

Intervals } Compound  
Intervals.

Those in the upper line are the simple intervals, the other three the compound ones, *i. e.* such as are either doubled, tripled, or quadrupled.

To reduce a compound interval to a simple one, Mr. Broffard gives this rule : From the denominator thereof take seven, and what remains is the simple interval ; as from a thirteenth take seven, there remains six, which shews the thirteenth to be the sixth doubled : again, from twenty-six take seven three times, which are twenty-one, and five remains ; therefore, says he, the twenty-sixth appears to be the fifth quadrupled.

But this distinction, into simple and compound, regards practice only, because there is really no such thing as a least interval. Besides by a simple interval here, is not meant the least practised, but such as tho' it were equal to two or more lesser, which are in use ; yet, when we would make a sound move so far up and down, we always pass immediately from one of its terms to the other.

What is meant then by a compound interval, will be very plain ; it is such whose terms are in practice, taken either in immediate succession, or such where the sound is made to rise and fall from the one to the other, by touching some intermediate degrees ; so that the whole becomes a composition of all the intervals from one extreme to the other.

What we now call a simple interval, the antients called *diastem* ; and our compound one, they called *sytem*. Each of these has differences ; even of the simple, there are some greater and some lesser, but they are always discord ; but of the compound or *sytem*, some are concord, and others discord. Unisons, 'tis plain, cannot possibly have any variety ; for when there is no difference, as in uniso-

nance, which flows from a relation of of equality, 'tis evident there can be no distinction : unisons therefore are often called concords, (tho' they may not properly be so called). But an interval depending on a difference of time, or a relation of inequality, admits of variety ; and so the terms of every interval, according to their particular relation or difference, make either concord or discord. Some indeed have restrained the word concord to interval, making it include a difference of tune : But this is precarious ; for as the word concord signifies an agreement of sounds, it is certainly applicable to unisons in the first degree. Intervals, 'tis plain, may differ in magnitude, and there may be an infinite variety, according to the possible degrees of tune ; for there is no difference so great or so little, but a greater or lesser may possibly be conceived : 'tis true, with regard to practice, there are limits which are the greatest and least intervals our ears can judge of, and which may actually be produced by voice or instrument.

The degrees of tune are proportionable to the number of vibrations of the sonorous body, in a given time ; or the velocity of their courses and recourses. Now these differences in tune constitute, as has been already said, the intervals in music ; these therefore must be greater or lesser, as the differences are ; and 'tis the quantity of these, which is the subject of the mathematical part of music.

These intervals are measured, not in the simple differences or arithmetical ratios of the numbers expressing their vibrations or lengths ; but in their geometric ratios, and vice versa : it is however to be observed, that in comparing the equality of the intervals, the ratios expressing them, must be all of one species, otherwise

wife this absurdity would follow, that the same two sounds may make different intervals. To determine in general, which of two or more intervals is the greatest, take all the ratios as proper fractions, and the least fraction will be the greatest interval.

The antients were extremely divided about the measuring of intervals. Pythagoras and his followers measured them by the ratios of numbers. They supposed the differences of gravity and acuteness to depend on the different velocities of the motions that cause sound; and thought therefore, that they could only be accurately measured by the ratios of those velocities; which ratios were first investigated by Pythagoras, on occasion of his passing by a smith's shop, and observing a concord between the sound of the hammers striking on the anvil. Aristoxenus opposed this: he thought reason and mathematics had nothing to do in the case, and that sense was the only judge in the dispute; the other being too subtle, to be of any use. He therefore determined the octave, fifth, and fourth, which are the most simple concords, by the ear; and by the difference of the fourth and fifth, he found out the tone, which he settled as an interval the ear could judge of; he also measured every interval by various additions and subtractions, made of those mentioned one with another. Ptolemy keeps a middle way between the two; he finds fault with one for despising reason, and with the other for excluding sense; and shews how these two might mutually assist each other in this matter. Aristoxenus says, there are two principal differences in intervals; the first is that of magnitude, and the other as being concord and discord; for, says he, every concord differs in magnitude from every discord; which may be interpreted, that every interval is of a different compass or extent from another. As concords and discords, intervals have many differences; but of these, magnitude is the principal. But Euclid reckons five differences of intervals, first in magnitude; second, in kind; third, in being either concord or discord; fourth, in being simple or compounded; and lastly, rational or irrational. First then, intervals differ in magnitude, in which respect some are called minor, such as ditonus, trieminitonium, tonus, heminitonium, and diesis;

others major, as diatessaron, diapente, and diapasen. In the genus or kind, intervals differ, as being either diatonic, chromatic, or enharmonic, *i. e.* divided as each of these require. As concords and discords they differ; the concords are diatessaron, diapente, diapasen, and the like; and all intervals less than a fourth or diatessaron, are dissonant, as well as those situated between the concords. And lastly, they differ as to rational and irrational: rational intervals are such as we can distinguish by numbers, as the tone, heminitonium, ditonus, tritone, &c. The irrational are such whose magnitudes vary in an irrational manner, *i. e.* so that we cannot fix a certain proportion between their two extremes in numbers.

But in the modern system of music, intervals are founded on certain ratios or proportions expressible in numbers, which may all be analysed into the prime numbers 2, 3, and 5. And all intervals may be found from the octave, fifth, and third major, which respectively correspond to those numbers. These are the musician's elements, from the various combinations of which, all the agreeable variety of relations of sounds result. And Dr. Pepusch, in the *Phil. Trans.* n° 481, assures us, it may be looked on as the standard of truth; and that every interval that occurs in music is good or bad, as it approaches to, or deviates from what it ought to be on these principles. Mr. Euler, in his *Nov. Theor. Mus.* defines an interval, the measure of the difference of an acute and grave sound: thus, suppose three sounds  $a, b, c$ , of which  $c$  is the most acute,  $a$  the most grave, and  $b$  the intermediate sound. It appears, that the interval between the sounds  $a$  and  $c$ , is the aggregate of the intervals between  $a$  and  $b$ , and between  $b$  and  $c$ . Therefore, if the interval between  $a$  and  $b$ , be equal to that between  $b$  and  $c$ , which happens when  $a : b :: b : c$ ; the interval between  $a$  to  $c$ , will be double the interval  $a$  to  $b$ , or  $b$  to  $c$ . This being considered, it will appear that intervals ought to be expressed by the measures of the ratios, constituting the sounds forming those intervals: but ratios are measured by the logarithms of fractions, the numerators of which denote the acute sounds, and the denominators the grave. Hence the interval between the sounds  $a$  and  $b$ , will be expressed by the logarithm

garithm of the fraction  $\frac{b}{a}$  which is usually denoted by  $L \frac{b}{a}$ ; or, which comes to the same, by  $Lb - La$ . The interval therefore of equal sounds,  $a$  to  $a$ , will be null, as  $La - La = 0$ . The interval called an octave, or diapason, will be expressed by the logarithm of 2; and the interval of the fifth or diapente, will be  $L \frac{1}{2} = L3 - L2$ . From whence it appears, that those intervals are incommensurable; so that no interval, however small, can be an aliquot part, both of the octave and fifth. The like may be said of the intervals  $L \frac{2}{3}$  and  $L \frac{3}{4}$ , and others whose logarithms are dissimilar. But intervals expounded by logarithms of numbers, which are powers of the same root, may be compared. Thus the interval of the sounds 27 : 8, will be the interval of the sounds 9 : 4, as 3 is to 2: for  $L \frac{27}{8} = 3 L \frac{3}{2}$ , and  $L \frac{9}{4} = 2 L \frac{3}{2}$ . Euler. *ibid.* p. 74. But tho' the logarithms of numbers, which are not powers of the same root, be incommensurable, yet an approximating ratio of such may be found. Thus, the measure of the octave is  $L2 = 0.3010300$ , and the measure of the fifth is  $L3 - L2 = 0.1760913$ . Hence the interval of the octave will be to that of the fifth, nearly as 3010300 to 1760913; which ratio being reduced to smaller terms, will give us these simpler expressions for the ratio of the octave and fifth, 2 : 1, 3 : 2, 5 : 3, 7 : 4, 12 : 7, 17 : 10, 29 : 17, 41 : 24, 53 : 31, which last is very near the truth. Euler. *id.* p. 75. In like manner, intervals may be divided into any number of equal parts: for this purpose we need only divide the logarithm of the proposed interval into the same number of parts, and then find its corresponding number by the tables. The ratio of the number so found, to unity, will give the required ratio of the divided interval to its proposed part. Thus let the third part of an octave be required; its logarithm will be  $= 0.1003433 = \frac{1}{3} L2$ : the ratio corresponding nearly to this, will be 53 : 50, or less accurately, 29 : 23, or 5 : 4, which last expresses the third major; and this is by the less knowing taken for the third part of an octave, and seems to be such on our harpsichord and organs, where from C to E is a third, from E to G  $\sharp$  another, and from G  $\sharp$  or A  $\flat$  to c, ano-

ther third. But the more intelligent know, that G  $\sharp$  and A  $\flat$  ought not to be reputed the same sound, since they differ by a diesis enharmonica, which is nearly equal to two commas.

**INTERVALS**, in gardening and husbandry, the spaces left between the several rows of plants sown or set in gardens or fields. See the article **HUSBANDRY**.

**INTESTATE**, in law, a person that dies without making a will; in which case, a distribution of his personal estate, after his debts and funeral charges are paid, is to be made among the wife and children of the deceased, or for want of such, among the next of kin. Here the statute, immediately upon the intestate's death, vests an interest in the persons intitled, so that if one dies before the distribution, his share is to go to his executors and administrators, and not to the survivors of the next akin to the intestate. See the article **ADMINISTRATOR**.

**INTESTINES**, in anatomy, long cylindrical, hollow, and membranaceous bodies; or rather, one such continued body, or tube, reaching from the stomach to the anus.

In these we are to observe, 1. Their length, which is usually six times the height of the person they belong to.

2. Their wonderful circulations, and the uses of them. 3. Their connection by means of the mesentery, with the vertebrae of the loins. 4. Their number, which tho' properly, as already observed, but one, yet is it usually made six, whereof three are called the small intestines, *intestina tenuia*, viz. the omentum, jejunum, and ilium; and the other three, the larger intestines, *intestina crassa*, viz. the caecum, colon, and rectum. See the articles **OMENTUM**, **JEJUNUM**, &c.

The structure and substance of the intestines are membranaceous; being formed, in every part, of five coats or tunics. The first is the common coat, from the peritonæum, and is membranaceous. The second is cellular, and is called by late writers, *tunica cellulosa* Ruyfchii; it is continuous with the mesentery, and is to be discovered by inflating it: this coat, in fat animals, frequently contains abundance of fat. The third is muscular; it is composed of a double series of fibres, in part longitudinal, and in part annular; and these assist the motion of the guts. The fourth coat is nervous: it is furnished with abundance of cellu-

les,

les, vascules, and glands, and is thicker than the others: from this arise the rugæ, and the valves of the intestines. The fifth is the villous coat, which sustains the terminations of the excretory vessels, and the beginnings of the lacteals: hence, when nicely examined, it has the appearance of a sieve: it is the organ of percolation of the chyle.

The intestines have vessels in great abundance, running over every part of their substance. Their arteries are from the meseriæ ones; the upper meseriæ serving for the smaller intestines, the lower for the larger; and these make a multitude of very singular and surprising anastomoses. The veins are meseriæcs, and go off to the vena portæ and the liver. The nerves are sent from the intercostals, and the par vagum. And beside these we are to observe the lacteal vessels. See the article LACTEAL.

The rectum, it is to be observed, receives blood-vessels also from the hypogastrics. There are also, besides the brunnerian glands of the duodenum, other glands in the intestines, called from the name of the person who discovered them, glandulæ Peyerii. These, in the small guts, are usually little, congregate, and miliary; but sometimes they are single. They are larger as they are nearer to the duodenum, and smaller as they approach towards the great guts. Their office is to discharge into the intestines a liquor, which serves for the attenuation of the chyle, and for the lubricating of the intestines. In the larger guts, and in the vermiform appendage, they are single and large, of a lenticular figure; and they are largest of all in the rectum. They have mouths, out of which there is secreted a fluid, which serves to lubricate the sides of the intestines, and to soften the fæces, that they may be evacuated without pain.

The use of the smaller guts is to promote the formation of the chyle, to perfect its secretions, and to propel the remaining fæces to the larger. The office of the larger guts is to receive and collect the matter of the fæces, and at a proper time to expel it. See CHYLE.

In the annexed plate of the intestines, *a, a*, (plate CXLVI. fig. 3. n<sup>o</sup> 1.) represent the liver turned upwards, in order to shew the gall-bladder *b*. The cystic duct, marked *c*, uniting with the hepatic duct *d*, forms the ductus com-

munis choledocus *e*. The vena portæ is marked *f*; some small branches of the hepatic artery, *g*; the umbilical vein, *b*; the stomach, with its coronary vessels, *i, i, i*; the spleen, *k*; a portion of the omentum, with some of the adipose glands, *l, l, l*; the windings of the small intestines, *m, m, m*; part of the colon, *n, n, n*; the muscular fascia of the colon, *o, o, o*; the extremity of the colon, *p*, where it makes a flexure in order to form the rectum, *q*; the extremity of which, marked *r*, is called the anus. The sphincter-muscle of the anus, is marked *s*; and its elevators, *t, t*.

N<sup>o</sup> 2. *ibid.* represents the oesophagus, marked *A*; the stomach, marked *B*; the pancreas, marked *C, C*; the pancreatic duct, marked *D*; and the duodenum, marked *E*.

*Falling out of the INTESTINES.* See the articles HERNIA and RUPTURE.

*Inflammation of the INTESTINES.* See the article INFLAMMATION.

*Wounds of the INTESTINES,* especially of the small guts, admit of little or no hopes of a cure; yet as the great guts sometimes admit of the future to advantage, it is better to use a doubtful remedy than none: besides that, by this means, the discharge of the chyle and fæces into the cavity of the abdomen, which would occasion great mischief, is prevented.

Small wounds of the intestines, not exceeding the size of a goose-quill, should by no means be stitched, but left to nature; as they frequently unite much sooner this way, than if irritated by the suture. But large wounds are to be stitched up with the glover's suture, before the intestine is returned.

To perform this, you are to be provided with a small needle threaded with silk; an assistant should take hold of one part of the gut by a fine piece of linnen well aired, while the surgeon should hold the other part in his left hand, and sew up the whole wound after the glover's manner, leaving very small spaces, not more than the twelfth of an inch each, between each of the stitches. The last stitch should be fastened with a knot, but the other end must hang about a foot out of the abdomen, by means of which the silk may be drawn out when the intestine is healed. After this is performed, the wound of the abdomen is next to be taken care of, and stitched up, keeping the lower or depending part of

the



Fig. 1. INFINITE SIMALS.

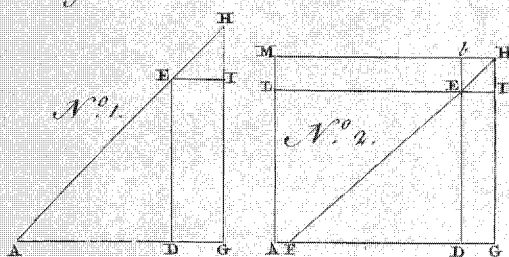


Fig. 2. INFLECTION.

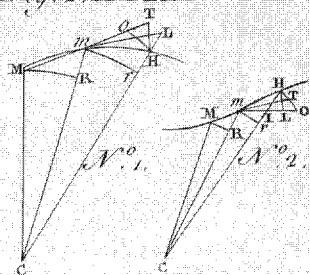
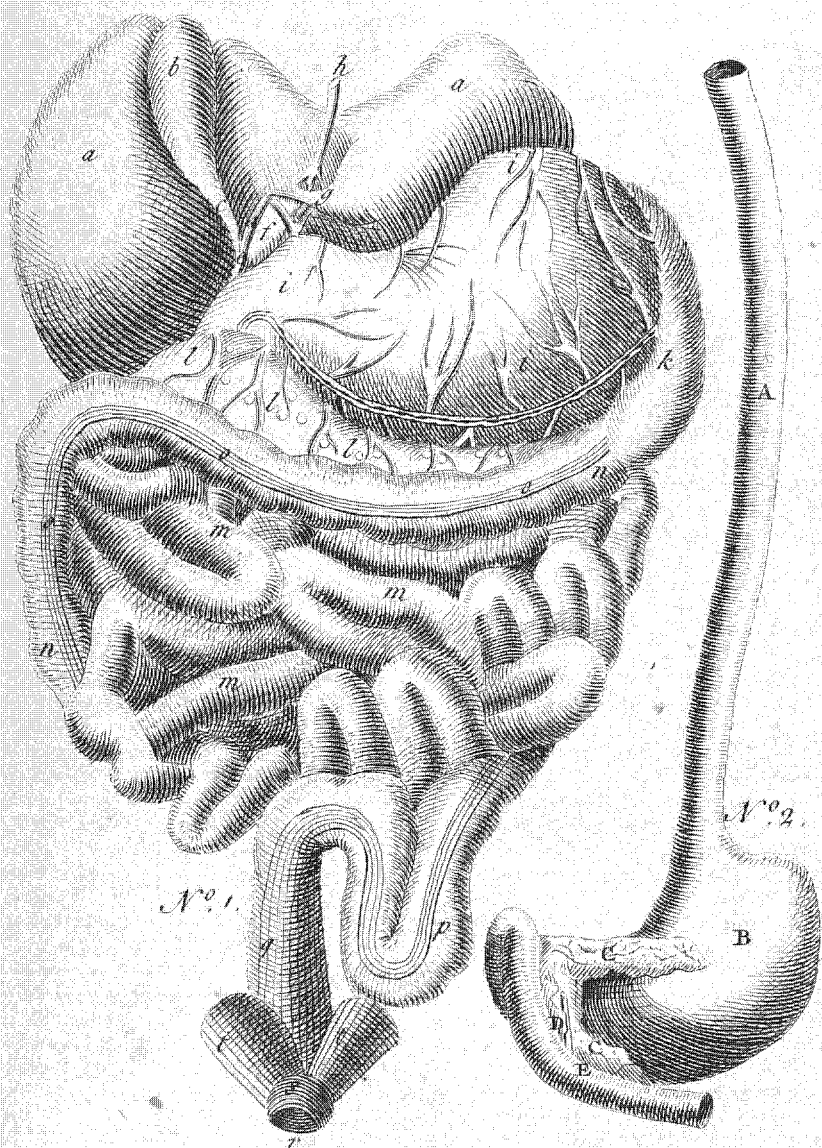


Fig. 3. I N T E S T I N E S.





the wound open with a tent, till all the preternatural fluids are discharged out of the cavity of the abdomen, and till the union of the wound in the intestine shall give leave to draw away the silk with which the suture was performed on it. See the article *GASTRORAPHY*.

As the modern surgeons, however, have found that few are saved who have received any large wound in the intestines, and that in those few who do recover, the wounded parts, from the fineness of the coat of the gut, do not properly unite, but rather adhere to the inner part of the peritoneum, or to the omentum, or to some other of the intestines, they rather choose now to let alone the operation of the suture of the gut, and substitute a gentler method of cure. They pass a waxed thread through a fine needle, and with this they fasten the wounded part of the intestine to the internal orifice of the wound in the abdomen. The thread that in this case hangs out of the abdomen, is to be so firmly fixed by the application of sticking-plasters to the wound, that the intestine cannot recede from the part to which it was fastened, nor can it evacuate any of its contents into the cavity of the abdomen. When this operation is well performed, the intestine easily adheres to the internal part of the abdomen, and the patient suffers infinitely less pain and hazard, than from the former way of making the suture. The same method of cure also is the proper one for wounds of the stomach, where they are within the reach of the hand, and it is sometimes crowned with success.

Where any part of the intestines is carried away, the case is plainly desperate; yet some of the late eminent surgeons having observed, that the lips of the intestines, so wounded, would sometimes unexpectedly adhere to the wound in the abdomen, took this hint from nature toward a cure in such desperate cases. Whenever, therefore, a surgeon is called in a case of this kind, after diligently examining the state of the upper part of the intestine which has suffered the loss of substance, he should stitch it to the external wound; for by this means the patient may not only be saved from instant death, but there have been instances where the wounded intestine has been so far healed, that the feces which used to be voided by the anus, have been voided by the wound in the abdomen. And

this, tho' from the necessity of wearing a tin or silver pipe, or keeping cloths constantly upon the part to receive the excrement, may seem to be very troublesome; yet it is surely far better to part with one of the conveniencies of life, than to part with life itself; besides, the excrements that are voided by this passage, are not so offensive in smell, as those voided per anum.

The same method of cure may conveniently also be put in practice, where any part of the intestine is mortified, by having been thrust out of the abdomen; for in this case if you tie up the mesenteric arteries, the corrupted or mortified part of the intestine may be cut off, and the remaining sound part made to adhere to the wound of the abdomen. And it is surely better to try this method and save if it be only a few by it, than to leave all in this unhappy situation to perish without help.

**INTESTINAL**, something belonging to, or seated in the intestines. See the preceding article.

Heister gives the name of intestinal fever to a species of fever called by others mesenteric. See *MESENTERIC*.

To this species he also refers the dysenteric, catarrhal, and petechial fevers. See *FEVER*, *DYSENTERY*, *PETECHIAL*, &c.

**INTRADA, ENTRY**, in the Italian music, is much the same with prelude or overture. See the article *PRELUDE*.

**INTRENCHMENT**, or **RETRENCHMENT**, in the art of war. See the article *RETRENCHMENT*.

**INTRIGUE**, or **INTREAGUE**, an assemblage of events or circumstances, occurring in an affair, and perplexing the persons concerned in it.

In this sense, it is used to signify the nodus or plot of a play or romance; or that point wherein the principal characters are most embarrassed, through the artificer and opposition of certain persons, or the unfortunate falling out of certain accidents and circumstances.

In tragedy, comedy, or an epic poem, there are always two designs; the first and principal is that of the hero of the piece.

The second contains the designs of all those who oppose him: these opposite causes produce opposite effects; to wit, the efforts of the hero for the execution of his design, and the efforts of those who thwart it. As those causes and designs are the beginning of the action, so these efforts are the middle, and there form a

knot or difficulty which we call the intrigue, that makes the greatest part of the poem. It lasts as long as the mind of the reader or hearer is suspended about the event of those opposite efforts: the solution or catastrophe commences when the knot begins to unravel, and the difficulties and doubts begin to clear up. The intrigue of the *Iliad* is twofold, the first comprehends three days fighting in Achilles's absence, and consists on the one side in the resistance of Agamemnon and the Greeks, and on the other in the inexorable temper of Achilles. The death of Patroclus unravels this intrigue, and makes the beginning of a second. Achilles resolves to be revenged, but Hector opposes his design; and this forms the second intrigue, which is the last day's battle.

In the *Æneid* there are also two intrigues, the first is taken up in the voyage and landing of Æneas in Italy; the second is his establishment there: the opposition he met with from Juno in both these undertakings, forms the intrigue.

As to the choice of the intrigue, and the manner of unravelling it, it is certain they ought both to spring naturally from the ground and subject of the poem. Bossu gives us three manners of forming the intrigue of a poem; the first is that already mentioned; the second is taken from the fable and design of the poet; in the third the intrigue is so laid, as that the solution follows from it of course.

**INTRINSIC**, a term applied to the inner, real, and genuine values, properties, &c. of any thing, in opposition to their extrinsic or apparent values, &c. See the article **EXTRINSIC**.

**INTRUSION**, in law, obtains where an ancestor dies seised of an estate, or inheritance which is expectant upon an estate for life, and the tenant for life dies; after which a stranger enters before the heir, in which case he is said to intrude. Bracton says, that intrusion signifies any unlawful entry upon lands, &c. by a person who has no right to the same, in prejudice of the person to whom they are legally decended. The difference between an intruder and an abator, according to Fitzherbert, is this, *viz.* that an abator enters into lands, &c. void by the death of a tenant in fee, whilst an intruder enters on lands void by the death of a tenant for life or years. An entry on the king's lands and possessions upon the death of a tenant, &c. is term-

ed intrusion against the king, for which an information may be exhibited; tho' before office is found, he that occupies the land shall not be an intruder, and yet the king is entitled to the profits thereof after the tenant's estate is ended.

**INTRUSION DE GARD**, was a writ formerly in use, where an infant or person within age entered upon his lands, and kept out his lord.

**INTRUSIONE**, is a writ which lies against an intruder at the suit of him that has the fee, &c. If a person has only an estate-tail, he may not have this writ, but is to bring a writ of formedon.

**INTUITION**, among logicians, the act whereby the mind perceives the agreement or disagreement of two ideas, immediately by themselves, without the intervention of any other; in which case, the mind perceives the truth as the eye doth the light, only by being directed towards it. Thus the mind perceives that white is not black, that three are more than two, and equal to one and two. See the article **IDEA**.

This part of knowledge, says Mr. Locke, is irresistible, and, like the sun-shine, forces itself immediately to be perceived as soon as ever the mind turns its view that way. It is on this intuition that all the certainty and evidence of our ether knowledge depends; this certainty every one finds to be so great, that he cannot imagine, and therefore cannot require, a greater. See the articles **JUDGMENT**, **KNOWLEDGE**, **DEMONSTRATION**, &c.

**INVALID**, a person wounded, maimed, or disabled for action by age, &c. For the colleges or hospitals built for the reception and accommodation of invalids, or soldiers and seamen worn out and disabled in the service, see the articles **COLLEGE** and **HOSPITAL**.

**INVECTED**, in heraldry, denotes a thing fluted or furrowed.

Invected is just the reverse of ingrailed, in which the points are turned outward to the field, whereas in invected they are turned inward to the ordinary, and the small semicircles outward to the field. See plate **CXLV**. fig. 5.

**INVECFIVE**, in rhetoric, differs from reproof, as the latter proceeds from a friend, and is intended for the good of the person reproved; whereas the invective is the work of an enemy, and entirely designed to vex and give uneasiness to the person against whom it is directed.

**INVENTION**,

**INVENTION**, denotes the act of finding any thing new, or even the thing thus found.

Invention is, according to lord Bacon, of two very different kinds, the one of arts and sciences, the other of arguments and discourse: the former he sets down as absolutely deficient. That the other part of knowledge is wanting, says he, seems clear; for logic professes not, nor pretends to invent either mechanical or liberal arts; nor to deduce the operations of the one, or the axioms of the other: but only leaves us this instruction, "To believe every artifi in his own art."

His lordship further maintains, that men are hitherto more obliged to brutes than reason for inventions. Whence those who have written concerning the first inventors of things, and origin of sciences, rather celebrate chance than art, and bring in beasts, birds, fishes and serpents, rather than men, as the first teachers of arts. No wonder, therefore, as the manner of antiquity was to consecrate the inventors of useful things, that the Egyptians, to whom many arts owe their rise, had their temples filled with the images of brutes, and but a few human idols amongst them. As to the invention of arts, continues our author, we are rather beholden to the wild goat for chirurgery, to the nightingale for music, to the stork for clysters, to the accidental flying off of a pot's cover for artillery, and, in a word, to chance, or any thing else, rather than logic.

Invention is therefore used for a subtilty of mind, or somewhat peculiar in a man's genius, which leads him to the discovery of things new; whence we say a man of invention.

Invention, according to Du Bos, is that part which constitutes the principal merit of works, and distinguishes the great genius from the simple artifi.

**INVENTION**, in rhetoric, being one of the second divisions of invention, according to Bacon, signifies the finding out and choosing of arguments which the orator is to use for proving his point, or moving his hearers passions.

This invention, in the opinion of that philosopher, cannot properly be called invention, which is the discovery of things not yet known, and not the recollecting things that are known; the only use and office of this rhetorical invention being out of the stock of knowledge already laid up, to select such articles as make

for the purpose. The same author divides the methods of procuring a stock of matter for discourse into two; the first of which is either by marking out and indicating the parts wherein a thing is to be searched after, which he calls the topical way; and the second is by laying up arguments for use that were composed before hand, and which he calls the promptuary way. See the articles **TOPICAL** and **PROMPTUARY**.

Cicero wrote four books upon invention, whereof two only are remaining. Invention, according to this author, is the principal part of oration.

**INVENTION**, in poetry, is applied to whatever the poet adds to the history of the subject he has chosen, as well as to the new turn he gives it.

**INVENTION**, in painting, is the choice which the painter makes of the objects that are to enter the composition of his piece.

M. Felibien gives the general name invention to every thing that depends on the genius of the painter, as the ordonnance, the disposition of the subject, and even the subject itself, when it is new. He also distinguishes invention into two kinds, that which arises immediately from the mind of the painter, and that which he borrows from some other: the first is when he absolutely invents the subject himself; and the second, when he borrows it from history, fable, &c.

Mr. de Piles observes, that invention is different from disposition, and that it is those two things together that form composition; for after having made a good choice of objects proper for the subject, they may be ill disposed, and then, tho' the invention be ever so good, the disposition will be faulty, and the piece will displease.

**INVENTION** is also used for the discovery of a thing hidden. Hence,

**INVENTION** of the holy cross. See the article *Invention of the Cross*.

**INVENTORY** in law, &c. is a schedule containing all the goods and chattles of a deceased person that belonged to him at the time of his death, together with the value of the same, as appraised by two or more indifferent persons.

Executors, as well as administrators, are to deliver in upon oath to the ordinary indented inventories, one part of which is to remain with the ordinary, and the other part with the executor or administrator. This is required for the benefit

of the creditors and legatees, that the executor or administrator may not conceal any part of the personal estate from them. The statute ordains, that the inventory shall be exhibited within three months after the person's decease; yet it may be done afterwards, for the ordinary may dispense with the time, and even with its being ever exhibited, as in cases where the creditors are paid, and the will is executed.

**INVERARY**, a parliament-town of Scotland, in the county of Argyle, of which it is the capital, situated on Lochfin, forty-five miles north-west of Glasgow: west long.  $5^{\circ}$ , north lat.  $56^{\circ} 28'$ .

**INVERNESS**, a parliament and port-town of Scotland, the capital of the county of Inverness, situated at the mouth of the river Ness: west long.  $4^{\circ}$  north lat.  $57^{\circ} 46'$ .

**INVERSE**, is applied to a manner of working the rule of three, or proportion, which seems to go backward, or contrary to the order of the common or direct rule. See the articles *RULE of three* and *PROPORTION*.

**INVERSE** *method of fluxions*. See the article *FLUXIONS*.

**INVERSE** *planting*. See *PLANTING*.

**INVERSION**, the inverting or turning any thing backwards.

**INVERSION**, in grammar, is where the words of a phrase are ranged in a manner not so natural as they might be.

It is a considerable beauty either in verse or prose, when we have it from an able hand; it gives vigour and variety to a sentence, and keeps the mind in an agreeable suspense and expectation of a marvellous turn and conclusion.

**INVERURY**, a parliament-town of Scotland, in the county of Aberdeen, situated on the river Don, ten miles west of Aberdeen.

**INVESTIGATION**, properly denotes the searchi<sup>g</sup> or finding any thing out by the tracts or prints of the feet; whence mathematicians, schoolmen, and grammarians, come to use the term in their respective researches.

Investigation of a theme, in grammar, is the finding out the primitive tense, mood, and person of any verb, far removed from its source. To understand a greek author, it is absolutely necessary to be well acquainted with the method of investigating a theme. This theme, in the greek tongue, is the present tense of the indicative mood.

Clenard was the first who introduced this term into grammar; he gives the title *investigatio thematis* to that part where he teaches the manner of finding whence any person or tense of a verb proceeds, and of reducing it to its primitive word, or finding its indicative.

**INVESTITURE**, in law, a giving livery of seisin or possession. There was anciently a great variety of ceremonies used upon investitures; as at first they were made, by a certain form of words; and afterwards, by such things as had the greatest resemblance to the thing to be transferred: thus where lands were intended to pass, a turf, &c. was delivered by the grantor to the grantee. In the church, it was customary for princes to make investiture of ecclesiastical benefices, by delivering to the persons they had chosen, a pastoral staff and a ring.

**INULA**, in botany, a genus of the *syngenesia-polygamia-superflua* class of plants, with radiated flowers: the receptacle is naked; the down is simple; and the antheræ terminate in setæ at their bases.

**INVOCATION**, in theology, the act of adoring God, and especially of addressing him in prayer for his assistance and protection. See the articles *ADORATION* and *PRAYER*.

The difference between the invocation of God and of the saints, as practised by the papists, is thus explained in the catechism of the council of Trent. "We beg of God, says the catechism, to give us good things, and to deliver us from evil; but we pray to the saints, to intercede with God, and obtain those things which we stand in need of. Hence we use different forms in praying to God, and to the saints: to the former we say, hear us, have mercy on us; to the latter we only say, pray for us." The council of Trent expressly teaches, that the saints who reign with Jesus Christ, offer up their prayers to God for men, and condemn those who maintain the contrary doctrine. The protestants reject and censure this practice as contrary to scripture, deny the truth of the fact, and think it highly unreasonable to suppose that a limited finite being should be in a manner omnipresent, and at one and the same time hear and attend to the prayers that are offered to him in England, China, and Peru; and from thence infer, that if the saints cannot hear their requests, it is inconsistent with common sense

sense to address any kind of prayer to them.

**INVOCATION**, in poetry, an address at the beginning of a poem, wherein the poet calls for the assistance of some divinity, particularly of his muse, or the deity of poetry.

The invocation is said to be absolutely necessary in an epic poem, as the poet relates things which he could not be supposed to know, unless he were inspired by some deity. Besides, it serves his readers as an example of piety, which ought to be the foundation of his whole work. Add to this, that the gods are to have a part in the action, and it is not decent he should set them to work, without first asking them leave.

In the course of an epic poem, it is true, several invocations occur, particularly when any thing extraordinary comes to be related; as when Virgil describes the metamorphosis of Æneas's fleet into sea nymphs: but the first invocation is always the most considerable.

In the invocation, Bossu considers two things; the first is what the poet requests; and the second, to what deity he addresses his request. As to the first, Homer has so closely joined the invocation to the proposition, that he seems to invoke his muse for the whole work. Virgil, on the contrary, only requests his muse to furnish him with a part of his subject: he even mentions the particular part, in which he desires her assistance; and after proposing his matter, in all its extent, he begs the muse to acquaint him with the cause of it.

As to the deity invoked, the same author observes, that it must always be the divinity that presides over poetry in general, or that which presides over the particular subject of the work. Ovid's invocation in his metamorphosis, and likewise Lucretius's, is of this latter kind; those of Homer and Virgil are of the former: they only invoke the muses, and thus distinguish between the divinities who preside over poetry, and those who preside over the actions of the poem, and have parts in it. Lord Shaftsbury observes, that an invocation appears cold from a modern poet.

**INVOICE**, an account in writing of the particulars of merchandise, with their value, custom, charges, &c. transmitted by one merchant to another in a distant country.

One copy of every invoice is to be in-

serted verbatim in the invoice-book, for the merchant's private use; and another copy must, immediately upon shipping off the goods, be dispatched by post, or otherwise, to the correspondent. This copy is commonly drawn out upon a sheet of large post-paper, to the end of which is subjoined a letter of advice.

It must here be observed, that when a merchant ships off goods for his own account, the invoice sent to the factor contains only the quantity of goods, but nothing of the cost and charges; and the letter subjoined consists of instructions signifying in what manner the employer inclines to have his goods disposed of, and returns made.

**INVOICE-BOOK**, this book is paged, and contains copies of the invoices of goods sent to sea: for as a merchant is obliged to send his correspondent an invoice of all the goods he consigns to him, so it is reasonable that he should keep a copy of it for himself. For the further uses of invoice-books, see *BOOK of invoices*.

**INVOLUCRUM**, among botanists, that sort of calyx or cup, which surrounds a number of flowers together, every one of which has, besides this general cup, its own particular perianthium. See the article *CALYX*.

The involucre consists of a number of little leaves, disposed in a radiated manner.

**INVOLUTION**, in algebra, the raising of a quantity from its root to any power assigned. See *QUANTITY* and *POWER*.

Any simple quantity is involved by multiplying the exponent by that of the power required: thus, to raise, any simple quantity to its second, third, fourth, &c. power, is only to multiply its exponent 1, by 2, 3, 4, &c. and, in general, the power expressed by  $m$ , of any quantity, is had by multiplying its exponent by  $m$ . Thus, the second power of  $a$  is  $a^{2 \times 1} = a^2$ ; its third power, or cube, is  $a^{3 \times 1} = a^3$ ; and the  $m$ th power of  $a$  is  $a^{m \times 1} = a^m$ .

Also the square of  $a^4$  is  $a^{2 \times 4} = a^8$ ; the cube of  $a^4$  is  $a^{3 \times 4} = a^{12}$ ; and the  $m$ th power of  $a^4$  is  $a^{4 \times m}$ . The square of  $abc$  is  $a^2 b^2 c^2$ , the cube is  $a^3 b^3 c^3$ , and the  $m$ th power is  $a^m b^m c^m$ .

The coefficients must also be raised to the same power by a continual multiplication of itself by itself, as often as unit is contained in the exponent of the power required. Thus, the square of  $3a$  is  $3 \times$

$3 \times a^2 = 9a^2$ : and the cube of  $3ab$  is  $3 \times 3 \times 3 \times a^3b^3 = 27a^3b^3$ .

As to the signs, when the quantity to be involved is positive, it is obvious that all its powers must be positive too: and when the quantity to be involved is negative, then all its powers whose exponents are even numbers must be positive, and those whose exponents are odd numbers negative; because any number of multiplications of a negative, if that number be even, gives a positive. The

power then can only be negative when its exponent is an odd number, though the quantity to be involved be negative. Thus the powers of  $-a$  are  $+a^2$ ,  $-a^3$ ,  $+a^4$ ,  $-a^5$ ,  $+a^6$ , &c. those powers whose exponent are 2, 4, 6, &c. being positive; but those whose exponents are 1, 3, 5, &c. negative.

The involution of any compound quantity is performed by a continual multiplication of it by itself, as in the binomial  $a+b$ . Thus,

$$\begin{array}{r}
 a+b = \text{root.} \\
 \times a+b \\
 \hline
 a^2+ab \\
 + ab+b^2 \\
 \hline
 a^2+2ab+b^2 = \text{the square, or second power.} \\
 \times a+b \\
 \hline
 a^3+2a^2b+ab^2 \\
 + a^2b+2ab^2+b^3 \\
 \hline
 a^3+3a^2b+3ab^2+b^3 = \text{cube, or third power.} \\
 \times a+b \\
 \hline
 a^4+3a^3b+3a^2b^2+ab^3 \\
 + a^3b+3a^2b^2+3ab^3+b^4 \\
 \hline
 a^4+4a^3b+6a^2b^2+4ab^3+b^4 = \text{biquadratic, or fourth power.} \\
 \times a+b \\
 \hline
 a^5+4a^4b+6a^3b^2+4a^2b^3+ab^4 \\
 + a^4b+4a^3b^2+6a^2b^3+4ab^4+b^5 \\
 \hline
 a^5+5a^4b+10a^3b^2+10a^2b^3+5ab^4+b^5 = \text{the fifth power.} \\
 \times a+b \\
 \hline
 a^6+5a^5b+10a^4b^2+10a^3b^3+5a^2b^4+ab^5 \\
 + a^5b+5a^4b^2+10a^3b^3+10a^2b^4+5ab^5+b^6 \\
 \hline
 a^6+6a^5b+15a^4b^2+20a^3b^3+15a^2b^4+6ab^5+b^6 = \text{sixth power, \&c.}
 \end{array}$$

If the powers of  $a-b$  are required, they will be found the same as the preceding; only the terms, in which the exponent of  $b$  is an odd number, will be negative, because an odd number of multiplications of a negative produces a negative: thus, the cube of  $a-b$  will be found to be  $a^3-3a^2b+3ab^2-b^3$ ; where the second and third term are negative, the exponent of  $b$  being an odd number in these terms. In general, the terms of any power of  $a-b$  are positive and negative by turns. But the reader will find a general theorem, for raising a binomial to any power required, under the article BINOMIAL. If a quantity, consisting of three or more terms, is to be involved, it may be distinguished into two parts, which are to be raised to any power in the same manner as a binomial; and then, by the same rules, you may substitute, instead of the powers of these compound parts,

their values: thus,  $\overline{a+b+c}^2 = \overline{a+b+c}^2$   
 $= a^2 + b^2 + c^2 + 2ac + 2bc + 2ab$   
 $+ b^2 + 2ac + 2bc + c^2$ . And,  $\overline{a+b+c}^3$   
 $= a^3 + 3a^2b + 3a^2c + 3ab^2 + 3ab^2 + 3ac^2 + 3abc$   
 $+ 3b^2c + 3ac^2 + 3bc^2 + c^3$ .  
 In these examples,  $a+b+c$  is considered as composed of the compound part  $a+b$ , and the simple part  $c$ ; and then the powers of  $a+b$ , are formed by the binomial theorem, and substituted for  $\overline{a+b}^3$ , and  $\overline{a+b}^2$ .

The reverse of involution is called evolution, or the extraction of roots; that is, the finding the roots of the powers of any quantity, whether simple or compound. See the article EXTRACTION.

JOACHIMITES, in church-history, the disciples of Joachim a cistercian monk, who was an abbot of Flora in Calabria,



labria, and a great pretender to inspiration.

The joachimites were particularly fond of certain ternaries : the Father, they said, operated from the beginning till the coming of the Son ; the Son, from that time to theirs, which was the year 1260 ; and from that time the Holy Spirit was to operate in his turn. They also divided every thing relating to men, to doctrine, and the manner of living, into three classes, according to the three persons in the Trinity : the first ternary was that of men ; of whom the first class was that of married men, which had lasted during the whole period of the Father ; the second was that of clerks, which had lasted during the time of the Son ; and the last was that of the monks, in which there was to be an uncommon effusion of grace by the Holy Spirit : the second ternary was that of doctrine, *viz.* the Old Testament, the New, and the everlasting Gospel ; the first they ascribed to the Father, the second to the Son, and the third to the Holy Spirit : a third ternary consisted in the manner of living, *viz.* under the Father, men lived according to the flesh ; under the Son, they lived according to the flesh and the spirit ; and under the Holy Ghost, they were to live according to the spirit only.

**JOANNA**, one of the islands of Comoro, situated between the north-west part of Madagascar and Zanguebar, in Africa : east long. 45°, south lat. 12°

**JOB**, or *Book of JOB*, a canonical book of the Old Testament, containing a narrative of a series of misfortunes which happened to a man whose name was Job, as a trial of his virtue and patience ; together with the conferences he had with his cruel friends, on the subject of his misfortunes, and the manner in which he was restored to ease and happiness. This book is filled with those noble, bold, and figurative expressions, which constitute the very soul of poetry.

Many of the jewish rabbins pretend that this relation is altogether a fiction : others think it a simple narrative of a matter of fact, just as it happened : while a third sort of critics acknowledge that the groundwork of the story is true, but that it is wrote in a poetical strain, and decorated with peculiar circumstances, to render the narration more profitable and entertaining.

The time is not set down, in which Job lived. Some have thought that he was much antienter than Moses, because the

law is never cited by Job or his friends, and because it is related that Job himself offered sacrifices. Some imagine that this book was wrote by himself ; others say, that Job wrote it originally in syriac or arabic, and that Moses translated it into hebrew : but the rabbins generally pronounce Moses to be the author of it, and many christian writers are of the same opinion.

The worship of Job is of great antiquity among the greeks and latins : the greeks celebrate his festival on May 6, and the latins keep it on the same month. A great number of churches and chapels are dedicated to this holy man, particularly in Spain and Italy ; and he is invoked principally against the leprosy, the itch, the foul disease, and the like distempers.

**JOBBER**, in law, a person that buys and sells cattle for others. Hence stock-jobbers are persons who buy and sell stocks for other persons.

**IOGUIS**, among the east-indians, a kind of hermits, who generally stand under trees, or near their pagods. Some of them go stark naked, holding their arms across over their heads, and continue in that posture all their lives : others lie on the ground, with one leg higher than the other, and their arms raised above their head ; and these wretched penitents insensibly lose the use of their arms and legs : some confine themselves in cages, set on the top of a thick stake, fixed in the ground, and these cages are so small, that they put the penitent to prodigious torture : some holding a sabre in one hand, and a kind of shield in the other, go up a kind of crane, where hooking themselves to an iron, which runs a considerable way into their backs, they spring forward into the air, flourishing their sabres, and launching out into extravagant praises of their idols : and others plunge into the Ganges, in hopes of being devoured by a crocodile, fancying that by this means they shall obtain the happiness of the next life.

These miserable wretches are considered by the Indians as perfect models of piety and holiness : they are followed by persons of both sexes, who make a vow of devoting themselves to their service, and are wholly employed in soothing their voluntary sufferings by offering them alms and refreshments. They call the pious to their devotions by ringing a little bell ; and when they hold their spiritual conversations, they sit close in a ring, and

set up a banner, made of several pieces of stuff, fastened at the end of a stick.

**JOHN**, or *Gospel of St. JOHN*, a canonical book of the New Testament, containing a recital of the life, actions, doctrine, and death of our Saviour Jesus Christ, written by St. John the apostle and evangelist. See the article **GOSPEL**.

St. John wrote his Gospel at Ephesus, after his return from the isle of Patmos, at the desire of the christians of Asia. St. Jerom says, he would not undertake it, but on condition they should appoint a public fast, to implore the assistance of God; and that the fast being ended, St. John, filled with the Holy Ghost, broke out into these words, "In the beginning was the word," &c. The antients assign two reasons for this undertaking: the first is, because, in the other three Gospels, there was wanting the history of the beginning of Jesus Christ's preaching, till the imprisonment of John the Baptist; which, therefore, he applied himself particularly to relate. The second reason was, in order to remove the errors of the cerinthians, ebionites, and other sects.

**St. JOHN'S DAY**, the name of two christian festivals, one observed on June 24. kept in commemoration of the wonderful circumstances attending the birth of St. John the Baptist; and the other on Dec. 27, in honour of St. John the Evangelist.

*Christians of St. JOHN*. See **CHRISTIANS**.

**St. JOHN'S BREAD**, *ceratonia*, in botany. See the article **CERATONIA**.

**St. JOHN'S WORT**, a plant called by authors hypericum. See **HYPERICUM**.

*Sweet JOHNS*, in botany, a name sometimes given to the pink.

**St. JOHN'S**, in geography, one of the Philippine-islands, situated in 126° east lon. and 7° north lat.

**St. JOHN'S** is also an island in the bay of St. Lawrence, situated north of New Scotland: west lon. 65°, north lat. 47°.

**JOIGNY**, a town of Champagne, in France, thirty miles south-west of Troyes.

**JOINDER**, or **JOYNDER**, in law, signifies a joining of two persons in the same action: as for instance, if there are two joint-possessors of goods, and these are taken from one of them, they may both join in an action to recover them. An action against the owners of a ship, on account of goods damaged, must be brought against all of them: and where there are several partners in trade, and one has the management, actions must be brought against all the partners jointly. In ac-

tions personal, several wrongs may be joined in one writ; yet this cannot be done where some things are founded on a tort, and some on a contract, because they require a different plea and a different process. However, a general action of trespass, and a special action on the case, may be joined in one action; and any actions may be joined, in which the plea, not guilty, goes to all.

**JOINERY**, the art of working in wood, or of fitting various pieces of timber together.

It is called by the French *menuiserie*, *q. d.* small work, to distinguish it from carpentry, which is employed about large and less curious works. See the article **CARPENTRY**.

In the annexed plate (CXLVII.) are represented the tools employed in this art; where A is a work-bench; *b*, the hook; *c*, the screw; *d*, the hold-fast; *a*, *a*, *a*, holes in the legs of the bench; *e*, *e*, mallets; B, B, B, &c. planes of several sorts; where B<sub>1</sub> is called a fore-plane; B<sub>2</sub>, a jointer; B<sub>3</sub>, a strike-block; B<sub>4</sub>, a smoothing-plane; B<sub>5</sub>, a rabbet-plane; B<sub>6</sub>, the plough; C, C, C, chisels of several sorts; C<sub>1</sub> and C<sub>3</sub> being called formers; C<sub>2</sub>, a paring-chisel; C<sub>4</sub>, a skew-former; C<sub>5</sub>, a mortef-chisel; C<sub>6</sub>, a gouge; D is a square, *a* being called the handle; *b*, the tongue; *c*, the outer square; and *d*, the inner square; E, E, hand-saws; F, the bevil, with its tongue moveable upon a center; G, a gage; H, a piercer; *a* being its head; *b*, the pad; *c*, the stock; and *d*, the bit; I, a gimblet; K, an augre; *aa* being its handle; and *b*, its bit; L, a hatchet; M, a frame or bow-saw; N, a whip-saw; O, a tenant-saw; Q, a compass-saw; R, a hammer; and S, a foot-rule, to measure their work with.

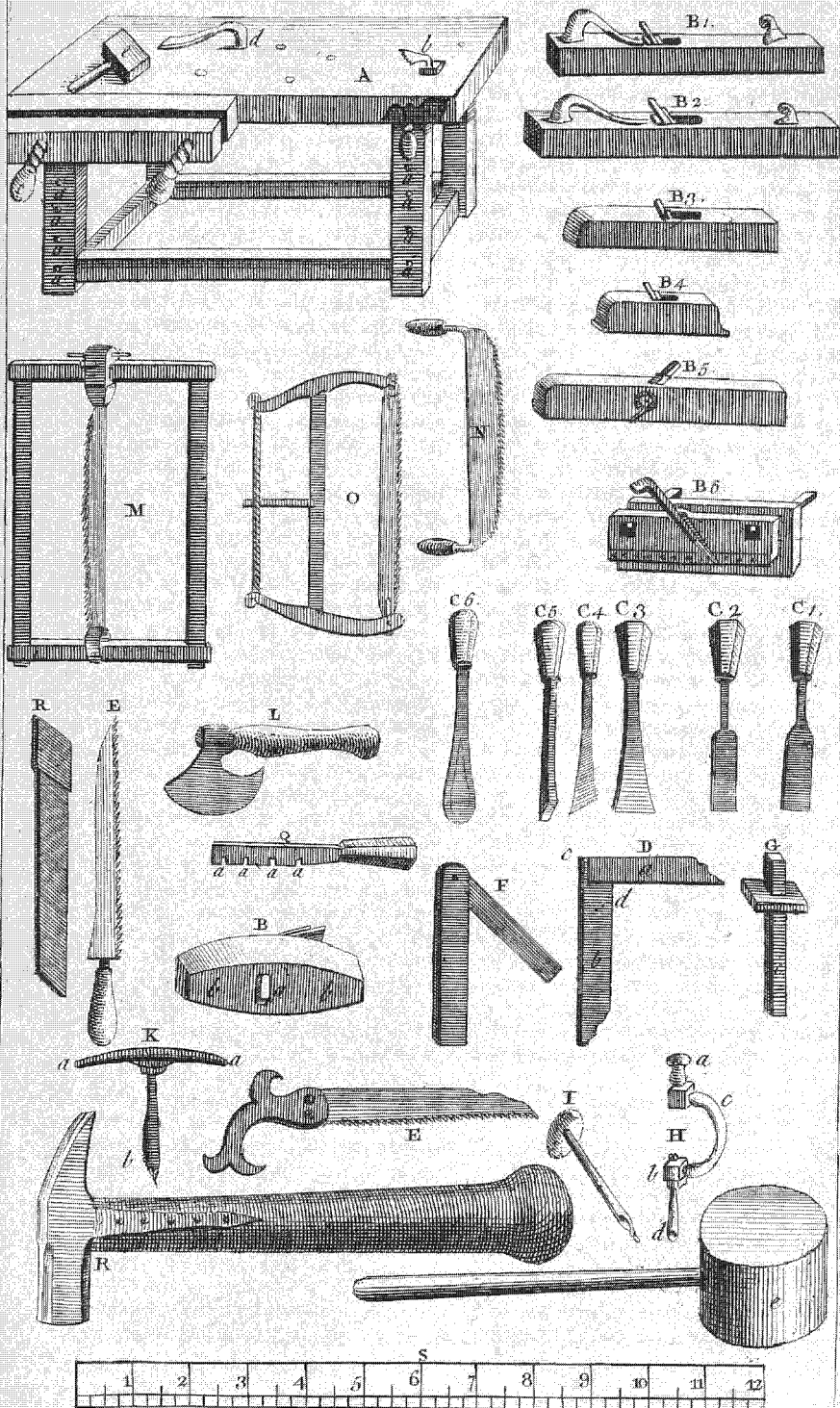
**JOINT**, in general, denotes the juncture of two or more things.

The joints of the human body are called by anatomists articulations. See the article **ARTICULATION**.

The term joint is also applied to the separation between the stones or bricks of a building, usually filled with mortar, plaster, or cement: also by carpenters, to the several manners of assembling or fitting pieces of wood together; as a dovetail joint, &c.

*Stiffness of the JOINTS*, in surgery and medicine, sometimes proceeds from the bones being broken, bruised, or wounded, especially about the extreme parts, which being

# Instruments used in JOINERY





being kept in one posture, in order for cure, the synovia of the joints becomes thick, and depraves or quite abolishes its motion ; or it may proceed from the bony juice proceeding from broken bones, and insinuating itself into the joint. Hoffman says, diseases of the joints sometimes proceed from spasms of the ligaments.

If difficulty of motion proceeds from long rest, it is to be treated with emollient and resolving fomentations, ointments, oils, and the hot fat of animals, often rubbed upon the joint ; at the same time using a gentle flexure, till the motion is gradually restored. If these will not do, then warm emollient baths must be used, or hot-bath-waters, till the inspissated liquor is dissolved, and the motion as much as possible restored. If it proceeds from the juice of broken bones, or the nodous gout, it is generally incurable, if the former remedies will not do.

**JOINT-EXECUTORS**, in law, are when two or more persons are appointed such by will ; in which case they are accounted but as one single person, so that the actions done by one of them are taken to be the acts of all, because they all represent the person of the testator : thus, where two joint-executors are possessed of a lease for years, in right of their testator, one of them may sell the term without the others joining ; and in like manner, where one joint-executor gives a release, the other is bound by it, each having an authority over the whole estate : but a joint-executor is not charged with the acts of his companion, any farther than he is actually possessed of the goods of the testator ; however, if joint-executors enter into an agreement, that each shall intermeddle with particular parts of the testator's estate, in that case, each becomes chargeable for the whole, by agreement. It has been held, that two joint-executors cannot plead separate pleas, because their testator, if living, on an action brought against him, could have been allowed but one plea ; and that if all the executors are not named in an action brought by joint-executors, the action will abate. As to legatees, the receipt of one executor charges not the other.

**JOINT-LIVES**, in law, is where any thing is granted or given to two or more during their lives. See the article **LIFE**.

**JOINT-TENANTS**, are such as hold lands or tenements jointly by one title ; as where a man grants lands, &c. to two

persons and their heirs ; such persons, during their joint-tenancy, must jointly plead as well as be jointly sued, which is common to them with coparceners of lands. See the article **COPARCENERS**.

Every joint-tenant in an estate has a right to his own share, and may give lease or forfeit the same ; he may make a lease, but not a deed of feoffment, or grant, to any besides his companion. Joint-tenants cannot singly dispose of more than the part that belongs to them ; for where they join in any gift or grant of lands, in the judgment of the law, each gives but his respective part : therefore, if one joint-tenant grants a rent-charge out of his part, after his death the survivor shall have the whole land discharged, because the land will be his by survivorship : but where a lease for years is made by a joint-tenant, it cannot be avoided by the survivor. Sometimes joint-tenants enter into covenants, not to take advantage of each other by survivorship ; and, indeed, they, as well as tenants in common of inheritance, are bound by statute to make partition, in the same manner as coparceners.

**JOINTURE**, in law, generally signifies a settlement of lands and tenements, made on a woman in consideration of marriage. See the article **MARRIAGE**.

It also signifies a covenant, by which the husband, or some friends of his, assures lands, &c. to his wife for the term of her life. See the article **ANNUITY**.

Here it is observable, that an estate settled in jointure, which comes from the ancestors of the wife, and is not of the purchase of the husband, or some ancestor of his, will not be accounted a good jointure. Where no estate of inheritance is reserved to the husband and his heirs, but the estate is granted to the wife for life, or in tail, the remainder to a stranger ; this will not be a legal jointure, although the same is made by the husband or his ancestor.

In order to make a perfect jointure agreeable to the statute 27 Hen. VIII. cap. x. several things are to be observed : 1. That it be made to take effect for the wife's life, either in possession or profit, presently after the decease of her husband.

2. That it be for the term of her own life, or for a greater estate : it may however be limited to continue no longer than she remains a widow, &c. 3. That it be expressed to be in satisfaction of her whole

whole dower, and not a part thereof.

4. That, though it may be made either before or after marriage, yet, if before, the wife cannot waive it, and claim her dower at common law: but if made afterwards, she may, at the death of her husband. It is here said, that all other settlements in lieu of jointures, that are not pursuant to this statute, are jointures at common law, and no bars to claim of dower. See DOWER.

Upon the husband's death, the wife may enter on her jointure, and is not driven to a real action, as she is to recover dower at common law. Wherefore, on a lawful eviction of her jointure, she shall be endowed according to the rate of her husband's lands, of which she was entitled to dower by the common law; and should she be evicted of part of her jointure, she shall have dower for so much thereof. A husband committing treason shall not occasion a forfeiture of the wife's jointure; yet feme-coverts committing the same, or felony, are liable to forfeit their jointures; and upon conviction of recufancy, they incur the forfeiture of two parts in three of their jointures, as well as dowers.

JOINTURESS, or JOINTRESS, the person on whom a jointure is settled. See the preceding article.

Where an estate, settled on a wife, is a jointure by law, and the jointress makes any alienation thereof, either by fine, feoffment, &c. with another husband, such alienation shall be a forfeiture of the estate so settled, as a jointure: but a jointress may, by lease, demise and grant an estate for forty years, &c. if she live so long, or for life, without incurring a forfeiture. In case the jointress covinously suffers a recovery to bar the heir, he may enter presently upon the lands, &c.

JOINVILLE, a town of Champaign, in France, situated on the river Marne: east longitude  $5^{\circ} 15'$ , and north latitude  $48^{\circ} 27'$ .

JOISTS, or JOYSTS, in architecture, those pieces of timber framed into the girders and summers, on which the boards of the floor are laid.

Joists are from six to eight inches square, and ought seldom to lie at a greater distance from each other than ten, or, at most, twelve inches, nor ought they ever to bear a greater length than ten feet, or to be less into the wall than eight inches. All joists on the back of a chimney ought

to be laid with a trimmer, at six inches distance from the back.

Some carpenters furr their joists, as they call it; that is, they lay two rows of joists, one over another, the undermost of which are framed level with the under side of the girder; and the uppermost, which lie cross the lower ones, lie level with the upper side of the girder.

JONAH, or *Prophecy of JONAH*, a canonical book of the Old Testament, in which it is related, that Jonah was ordered to go and prophecy the destruction of the Ninevites; but that disobediently attempting a voyage another way, he was discovered by the rising of a sudden tempest, and cast into the sea, where he was swallowed up by a whale, which having lodged him three days and three nights in his belly, disgorged him upon the shore; whereupon being sensible of his past danger and surprising deliverance, he betook himself to the journey and embassy, to which he was appointed; and arriving at Nineveh, the metropolis of Assyria, he, according to his commission, boldly laid open to the inhabitants, their sins and misdeeds, and proclaimed their sudden overthrow; upon which the whole city, by prayer and fasting, and a speedy repentance, happily averted the divine vengeance, and escaped the threatened ruin.

IONIA antiently was a province of the lesser Asia, or Natolia, bounded by Etolia on the north, Lydia on the east, Caria on the south, and the Archipelago on the west.

IONIC ORDER, the third of the five orders of architecture, being a kind of mean between the robust and delicate orders. See plate CXLVIII, fig. 1.

The first idea of this order was given by the people of Ionia, who, according to Vitruvius, formed it on the model of a young woman of an elegant shape, dressed in her hair; whereas the doric had been formed on the model of a strong robust man. The ionic order is distinguished from the composite, in that it has none of the acanthus-leaves in its capital; and from the tuscan and doric, by the channels and flutings in its shaft.

The capital of this order is adorned with volutes, and its cornice with dentiles. The proportions of the ionic pillar, as they are taken from the famous one in the temple of Fortuna Virilis at Rome, now the church of St. Mary the Egyptian,

an, are these: 1. The entire order from the superficies of the area to the cornice, are twenty-two modules, or eleven diameters. 2. The column with its base contains eighteen modules. 3. The entablature contains four modules. 4. The volute of the capital is of an oval form. 5. The columns in this order are often hollowed, and furrowed with twenty-four gutters or channels, called flutings: these flutings are not always concave from the top of the shaft to the bottom, but for that third of it next the base, they are filled up with a kind of rods or canes; and in the other two thirds they are left hollow, or friated, in imitation of the folds or plaits of a garment.

When this order was first invented, its height was but sixteen modules; but the antients, to render it still more beautiful than the doric, augmented its height, by adding a base to it.

Mr. Le Clerc makes its entablement four modules and ten minutes, and its pedestal six entire modules; so that the whole order makes twenty-eight modules ten minutes.

This order is at present used properly in churches and religious houses, courts of justice, and other places of tranquility and devotion.

This order has one advantage above any of the rest, which consists in this, that the fore and hind parts of its capital are different from its sides; but this is attended with an inconvenience, when the ordonnance is to turn from the front of the building to the side; to obviate which, the capital may be made angular, as is done in the temple of Fortuna Virilis.

Scamozzi, and some other modern architects, have introduced the upper part of the composite capital, in lieu of the ionic, imitating that of the temple of Concord, whose four sides are alike. To render it a little more beautiful, the volute may be made a little oval and inclining.

For the base, cornice, freeze, and pedestal of this order, see the articles *BASE*, *CORNICHE*, &c.

**IONIC DIALECT**, in grammar, a manner of speaking peculiar to the people of Ionia.

At first it was the same with the antient attic; but passing into Asia, it did not arrive at that delicacy and perfection to which the Athenians attained. The Ionians generally changed the *α* into *η*, as

*σοφία* into *σοφῆ*: they put the *η* and *ι* for *ε*, and *αι* for *η*, as *αγῆσιον* for *αγῆσιον*: *αναγκαῖη* for *αναγκη*: they also change *α* and *ε* into *υ*, *αυ* into *ωυ*, *ει* into *ευ* and *εε*, *ευ* into *ω* and *ηυ*, and *εο* into *ευ*, as *βαλῆ* into *βηῖ*, *αληθεια* into *αληθητη*, *δαυμα* into *δωῦμα*, *αυθ* into *ωυθ*, *ποιεσθαι* into *ποιεασθαι*, *ημεεις* into *ημεεε*, &c. they also intert the *ι* and *υ*, as *εσιν* for *εσιν*, and *πολυς* for *πολυς*.

**IONIC SECT** was the first of the antient sects of philosophers; the others were the italic and eleatic. The founder of this sect was Thales, who being a native of Miletus in Ionia, occasioned his followers to assume the appellation of ionic: Thales was succeeded by Anaximander, and he by Anaximenes, both of Miletus; Anaxagoras Clazomenius succeeded them, and removed his school from Asia to Athens, where Socrates was his scholar. It was the distinguishing tenet of this sect that water was the principle of all natural things.

**IONIC TRANSMIGRATION** was antiently a very celebrated epocha; it took its rise from the retreat of the athenian colonies, who, upon the death of Codrus, put themselves under the command of his son Neleus, and established the twelve cities of Ionia in Asia. These colonies, according to Eratosthenes, were established fifty years after the return of the Heraclidae; and, according to Marham, seventy-seven years after the taking of Troy.

**JOVIAL**, *jovialis*, among chemists, &c. something belonging to tin, as the bezoardicum joviale. See *BEZOARDICUM* and *TIN*.

**JONK**, or *JONQUE*, in naval affairs, is a kind of small ship, very common in the East-indies: these vessels are about the bigness of our fly-boats; and differ in the form of their building, according to the different methods of naval architecture used by the nations to which they belong. Their sails are frequently made of mats, and their anchors are made of wood.

**JONTHLASPI**, in botany, a plant called by Linnæus *clypeola*. See *CLYPEOLA*.

**JOSHUA**, a canonical book of the Old Testament, containing a history of the wars and transactions of the person whose name it bears. This book may be divided into three parts; the first of which is a history of the conquest of the land of Canaan; the second, which begins at the twelfth chapter, is a description of that

country, and the division of it among the tribes; and the third, comprised in the two last chapters, contains the renewal of the covenant he caused the Israelites to make, and the death of their victorious leader and governor. The whole comprehends a term of seventeen, or, according to others, of twenty-seven years.

**JOURNAL**, a day-book, register, or account of what passes daily.

**JOURNAL, or DAY-BOOK**, among merchants, is that wherein the transactions, recorded in the waste-book, are prepared to be carried to the ledger, by having their proper debtors and creditors ascertained and pointed out, for a more distinct account of which, see the article **Book**.

**JOURNAL**, at sea, is a register kept by the pilot and others, wherein notice is taken of every thing that happens to the ship from day to day, with regard to the winds, the rhumbs, the rake, soundings, &c. and in order to enable him to adjust the reckoning, and determine the place where the ship is.

For the method of correcting a journal at sea, by making proper allowances for the lee-way, variation, &c. see the articles **LEE-WAY**, **VARIATION**, **RECKONING**, &c.

The remarkable occurrences of the whole day being finished in the log-book, if the latitude by account agree with the latitude by observation, the ship's place will be truly determined; if not, then the reckoning must be corrected, before it be placed in the journal. See the article **LOG-BOOK**.

The form of the journal, together with an example of two days work, is as follows. **N. B.** To express the days of the week, the seamen commonly use in their books the characters by which the sun and planets are expressed, *viz.* ☉ denoting Sunday, ☿ Monday, ♀ Tuesday, ♁ Wednesday, ♃ Thursday, ♄ Friday, and ♅ Saturday.

**JOURNAL** is also a name common for weekly essays, news-papers, &c. as the *Gray's Inn Journal*, the *Westminster Journal*, &c.

**JOURNEYMAN**, properly one who works by the day only; but it is now used for any one who works under a master, either by the day, the year, or the piece.

**JOURNEYS-ACCOUNTS**, in law, signifies as soon as possible: thus, when a writ is rendered void by the death of the defend-

A Journal from the Lizard towards Jamaica, in the ship Neptune, J. M. commander.

Week Days.	Months.	Days.	Winds.	Direct Course.	Miles.	Latitude correct.	Whole diff. Lon. made.	Bearings and dist. from the Lizard.	Remarkable observations and accidents.
☿			NbF EbS NNE NEbE	S 31, 31 W	157.4	47° 46'	2° 5' W	At noon the Lizard bore N 31°, 31' E. dist. 157.4 Miles.	Fair weather at four P. M. I took my departure from the Lizard, bearing NNE, and distant five leagues.
♂			West NWbW SWbW	S 34, 10 E	48.2	47° 06'	1° 35' W	At noon the Lizard bore S 17°, 55' W dist. 183 Miles.	Strong gales of wind and variable.

ant, or for want of form, &c. the plaintiff becomes entitled to have a new writ by journeys-accounts, that is, within as little time as he possibly can, after the abatement of the first; in which case, the second writ is a continuance of the cause, as much as if the first writ had never abated. This second writ is to be brought within fifteen days at most, after the abatement of the first, which must have been without any fault of the plaintiff, other-

wise



wife a second writ cannot be brought by journeys-accounts : yet if the abatement be by default of the clerk, in not writing the writ in due form, the plaintiff may have it. The second writ must be brought for the same thing, and also in the same court as the first. This is to be observed, that judicial writs can never be had by journeys-accounts.

**JOYNERY, or JOINERY.** See **JOINERY.**

**IPECACUANHA**, in the materia medica, a west-indian root, of which there are two kinds, distinguished by their colour, and brought from different places, but both possessing the same virtues, though in a different degree. The one is grey, and brought from Peru ; the other is brown, and is brought from the Brazils : and these are indifferently sent into Europe under the general name of *ipecacuanha*.

These two sorts have been by some supposed to be the roots of two different plants, but this is a mistake ; the only difference is, that one grows in a different place, and in a richer and moister soil, and is better supplied with juices than the other.

The grey *ipecacuanha* ought to be chosen for medicinal juices, preferable to the brown, as the latter is apt to operate more roughly. The peruvian, or grey, *ipecacuanha* is a small and irregularly contorted and twisted root ; it is of the thickness of a goose-quill, and rises into a sort of annular ridges, running quite round the root. It is considerably hard, and does not cut easily through with the knife ; but on bending it much, it easily breaks. It is of a dusky greyish colour on the surface, and when broken appears of a clearer and paler grey, and discovers a tough and firm nerve, occupying its center, and running its whole length. The whole root is of a peculiar and somewhat pungent smell ; in taste it is acrid and somewhat bitterish, and upon the whole very disagreeable.

The brown, or brasilian, *ipecacuanha* resembles the other, but is more twisted and convoluted ; it is a smaller and shorter root, of a deep dusky brown on the outside, and white when broken : it is less acrid and more bitter than the grey-kind.

The grey and brown are both of them so acrimonious, that the people employed to pound any quantity of either, if they have not the caution very carefully to avoid the dust that arises from the mortar,

are often seized immediately afterwards with a difficulty of breathing, and spitting of blood, and sometimes with bleeding at the nose, and a great swelling and inflammation of the face, eyes, and throat ; these symptoms generally go off in a day or two of themselves ; but if they are more than ordinary violent, it may be proper to bleed for them.

*Ipecacuanha*, however, is an excellent, mild, and safe emetic ; it is also a noble restraining ; and given in doses too small to vomit, is the greatest of all remedies for a dysentery. Its dose, as an emetic is from six or eight to thirty grains, and the best way of taking it is in white wine, in which it should have first stood four and twenty hours. In dysenteries the patient is first to take such doses of it as will vomit him, and afterwards to continue the use of it for a long time, at the rate of three or four grains, in any form, twice a day. Small doses of *ipecacuanha*, are an excellent remedy in diarrhoeas of a more simple kind ; and in the fluor albus, we hardly know a better medicine.

**IPECACUANHA** is also a name given by the people of Virginia to a species of *filipendula*. See the article **FILIPENDULA**.

**IPOMÆA**, AMERICAN JASMINE, in botany, a genus of the *pentandria monogynia* class of plants, the corolla whereof consists of a single infundibuliform petal ; the tube is nearly cylindric, and very long ; the limb is patent, and divided into five semi-lanceolated plane segments ; the fruit is a roundish capsule, containing three cells ; the seeds, of which there are several in each cell, are of an oval figure. This plant is by some reckoned a species of the *convolvulus*. See plate **CXLIV.** fig. 4.

**IPSWICH**, a borough and port-town of Suffolk, situated on the river Orwel, twenty-four miles south-east of Bury.

It sends two members to parliament.

**IRELAND**, an island of the Atlantic ocean, subject to Great Britain, situated between  $5^{\circ}$  and  $10^{\circ}$  west longit. and between  $51^{\circ}$  and  $56^{\circ}$  north latitude ; being bounded by the Northern ocean on the north, by St. George's channel, which divides it from Great Britain, on the east, and by the Atlantic and Western ocean on the south and west. This country is two hundred and fifty miles long, and one hundred and fifty broad ; distant from Holyhead, in north Wales, fifty miles, and from Galloway, in Scotland, fifteen miles. It is divided into four large provinces,

vinces, viz. Ulster on the north, Leinster on the east, Munster on the south, and Connaught on the west.

**IRIS**, the RAINBOW, in physiology. See the article RAINBOW.

**IRIS**, in anatomy, the anterior coloured part of the uvea of the eye. See EYE.

The iris is a circular variously coloured part, which surrounds the pupil; it is in some persons blue, in others black, brown, grey, &c. each of which has its peculiar beauty, and is suited to the complexion of the person who has it.

**IRIS**, the FLOWER DE LUCE, in botany, a genus of the *triandra-monogynia* class of plants, under which is comprehended the xiphion, sisyrinchium, and hermodactylus of authors, the characters of which are these: the flower is monopetalous, but divided into six long and obtuse segments; the three exterior ones being reflex, or bent back, and the three inner ones erect and more acute; the fruit is an oblong, angular, and trilocular capsule, containing a great number of seeds. See plate CXLIV. fig. 5.

The florentine, or dry iris-root, is an attenuant and expectorant, and accordingly given with success in asthmas and disorders of the breast and lungs; the dose is from ten to fifteen grains in powder. The juice of the fresh root of our common iris is an excellent medicine in dropries; and the best way of giving it is in white wine, an ounce or two for a dose: it works both by vomit and stool, and carries off a very great quantity of phlegm. It is also ordered as a sternutatory, to be snuffed up the nose, in complaints of the head, which it eases very much, by bringing away the over-abundant phlegm:

**IRON**, *ferrum*, in natural history, the lightest of all metals excepting tin, but considerably the hardest of them all.

It is, when pure, naturally malleable and ductile under the hammer; but that in a less degree than either gold, silver, lead, or copper. When wrought into steel, or when in the impure state from its first fusion, in which it is called cast iron, it is scarce malleable at all: the most ductile iron in the world also, on being only heated and suddenly quenched in cold water, loses much of this quality.

Iron is extremely capable of rust; more so than any other metal; it is very sonorous; it requires the strongest fire of all the metals to melt it; it must be a very good furnace that will make iron run without the blast of bellows; but it is

found, when once heated to a proper degree, this blast will effect that without the assistance of the farther heat of any fuel being employed in it; for if an iron-bullet, made red-hot, be suspended at a distance from the fire, and the blast of a strong pair of bellows forcibly directed against it in that condition, it will in a little time melt and run down in drops, by the mere effect of the current of the air they convey to it. Iron is less simple in its composition than any of the heavier metals: it contains, indeed, a sulphur so imperfectly blended with the rest of its constituent matter, that it will readily get loose from it, and in a strong heat will appear in visible flames. It is the most difficult of all the metals to be amalgamated with mercury; the metallurgic authors in general, have said that it will not amalgamate with it at all; but, from the success of some late attempts towards making this union between them, it appears to be not impossible, that a method may be found of doing it.

Iron is less fixed in the fire, than most of the other metals; it manifestly fumes and sparkles, when exposed to a moderately fierce degree of it; it loses also a part of its weight in this heat, and much more when in fusion. Iron is remarkable for the effect fire has on it, in rendering it more ductile; most of the other metals are brittle, while they are hot; but this is most of all malleable, as it approaches nearest to fusion. It grows red-hot long before it melts, and is known to be approaching towards that state, by its becoming whiter, and by its sparkling; if taken from the fire, as soon as it runs, it is found to be more malleable for the fusion; but if it be kept long in that state, its sulphur dissipates in form of a white smoke; the metal after this becomes much more brittle, and in fine runs into a bluish glass.

Iron, exposed to the focus of a great burning glass, instantly grows red-hot, then turns whitish, sparkles and flames, and immediately after melts; soon after this the greatest part of it flies off in sparks, which appear very bright, and, if caught upon paper, are found to be so many little globular bodies, all hollow like bomb-shells: the remainder runs into a bluish or purplish glass; and this glass, exposed again to the same focus, on a piece of charcoal, takes up, from the vegetable fuel, the sulphur or inflammable principle it had lost, and becomes

Fig. 1. IONIC ORDER.

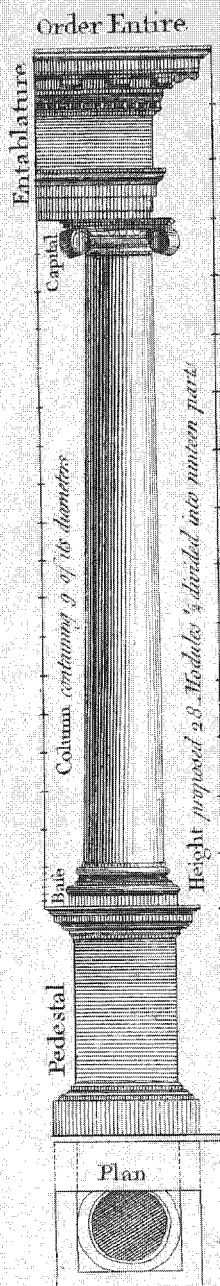
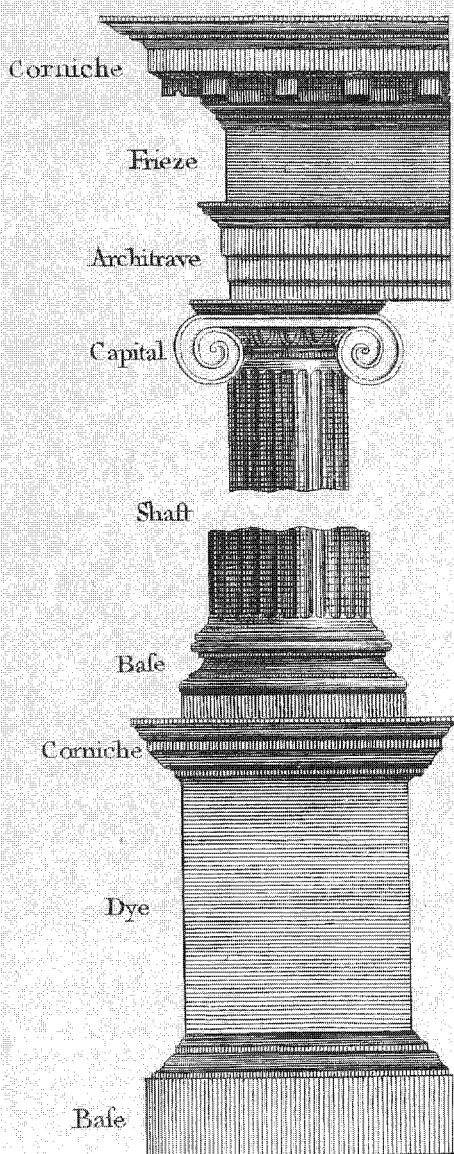


Fig. 2 ISOSCELES.

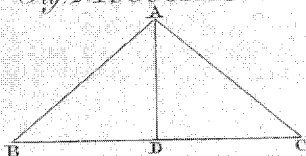
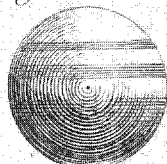


Fig. 3 JUPITER.





comes true iron again. Upon the whole, the effects of a common, and those of a solar fire, on this body, concur to prove, that it consists of vitriolic salt, a vitrifiable earth, and a peculiar bituminous matter, not found in any of the other metals. When perfectly pure, it readily melts with gold and silver, and unites with them in fusion; but if it be impure, it separates itself, and forms a distinct regulus above the surface of the other.

On being heated red-hot, it increases in bulk and in weight; but it returns to its former gravity and dimensions when cold.

Iron is soluble in all the stronger acids; spirit of nitre, or aqua fortis, succeed most readily in the solution of it; but, beside these, and all the other acids, it is to be dissolved also by a multitude of weaker menstrooms, among the rest even by common water; for on lying long in this fluid, it communicates a manifest taste to it, and contracts a rust, and throws off a yellow ochre. All salts, except the alkaline ones, readily dissolve iron; nay the very air has so much power over it in this respect, that the people who deal in utensils made of it, are obliged to cover them with some oily or fat substance, to make them retain their polish. To this may be added, that iron is the most easily of all metals destroyed by many other means: it neither resists the force of lead nor of antimony; but, on being fused with them, it almost immediately vitrifies, and is carried off in form of scoriae.

The great test of iron, is its answering to, or being attracted by, the magnet or loadstone; but then it must be in its true metalline state, for many of its ores will not answer in any part to this trial. Experiments, however, prove, that iron may be produced by art, out of almost every thing we know. Earths of almost all kinds afford iron by calcination; and all the parts of animals and vegetables, as well their fluids as their solids, yield it by the same means: if any plant, or part, or juice of a plant, be burnt to ashes, or the flesh, bones, blood, or fat of any animal, be treated in the same manner, iron will be found in the ashes, and that in so perfect a state, that it answers readily to the magnet. Honey, wax, and all other vegetable substances, collected by animals, contain iron, and it may be separated from them pure, in the same manner: finally, our Dr. Lister

takes great pains to prove, that this metal is found in, nay, and is the basis of the stone in the bladder.

Iron in the bowels of the earth, when it enters the composition of crystals in spars, seems to be two very different operations of the same metal; they sometimes concur, as there are found purple rhombic crystals of iron, and yellow cubic ones of lead; but in general it is much more frequent to be coloured hexangular sprigs, and colourless cubes and rhombs.

Among the gems, the amethyst, garnet, and hyacinth owe their colours to iron; and this metal has the same effect in the preparation of the facitious gems, as in the natural ones; for, properly managed, it communicates a purple or red colour in various shades and degrees, to glasses and to vitrified substances of all kinds.

True native iron is not to be expected in the midst of masses of its ore, but in detached sprigs or filaments in the fissures of rocks, the whole substance of which is rich in that metal: such have been all the genuine specimens of this rich fossil, and such their place of formation.

The ores of iron generally discover themselves to be such, either by their resemblance to wrought iron in structure and look, or by the yellowish or purplish tinge they are coloured with. Those which have most of all the appearance of the metal they contain, are usually the richest.

There is an iron-ore found in Sweden and Germany, particularly in the Hartsforest, which usually lies in the largest fissures of the strata, in great lumps, and is very hard, heavy, and of a bluish grey colour; this, when broken, has so much of the sparkling appearance of the metal, that a person unaccustomed to these subjects, might easily mistake it for real pure iron. This is the richest iron-ore known, unless we except some of the hæmatites. We have an ore very like this in the forest of Dean, in Gloucestershire, which is at this time worked to great advantage. Another kind we have in Derbyshire, which is also common to Sweden and to Germany; it resembles the former, but that it is harder; and when broken, it is not so bright and sparkling. There are also other very rich ores of a dusky brown colour, with a tinge of purple; of this kind are those worked at this time in Suffex, under the name of the cabala-vein. Another of the rich kinds, less common with us, is of a bluish purple, with a few bright spangles in it; but this is much

inferior.

inferior to the two former of those above-mentioned.

The poorer ores of iron are generally of a more lax and friable texture, and of a yellowish or reddish hue, or else of a mixed colour between these, and with a cast of brownish or blackish in it: but the most singular of all the ores of iron is a white one, which appears only like a debased crystal, having not the least sign of metal in it. The common ochres, as well the yellow as the red, are also to be ranked among the number of the ores of iron; they are very rich in that metal, and are even worked for it in some places to great advantage: nor are we to omit the mention of those elegant bodies which hang from the roofs of caverns in iron-mines, in form of icicles; these are truly stalactites of iron; they are generally produced in large clusters together, and called by the miners brush-ore: these are almost all iron. The cruusted ferruginous bodies, common in our gravel-pits about London, are also very rich in iron, and have been worked for it in places where they are sufficiently plentiful. The red substance called smit, is likewise a very rich iron-ore; this is much like the common Derbyshire reddle, but finer and heavier.

*Method of obtaining IRON from its ore, in a close vessel.* Roast for a few minutes in a test under the muffle, and with a pretty strong fire, two centners of the small weight of your iron-ore grossly pulverised, that the volatiles may be dissipated in part, and the ore itself be softened, in case it should be too hard. When it is grown cold, beat it extremely fine, and roast it a second time, as you do the copper-ore, but in a much stronger fire, till it no longer emits any smell; then let it grow cold again.

Compose a flux of three parts of the white flux with one part of the fusible pulverised glass, or of the like sterile unsulphureous scoriæ, and add glass-gall and coal-dust, of each one half part: add of this flux three times the quantity of your roasted ore, and mix the whole very well together: then choose a very good crucible, well rubbed with lute within, to stop the pores, which may be here and there unseen; put into it your ore mixed with the flux, cover it over with common salt, and shut it close with a tile, and with lute applied to the joints.

Put the wind-furnace upon its bottom part, having a bed made of coal dust.

introduce besides into the furnace, a small grate, supported on its iron-bars, and a stone upon it, on which the crucible may stand as upon a support; surround the whole with hard coals, not very large, and light them at top: when the vessel begins to grow red, which is indicated by the common salt's ceasing to crackle, stop with gross lute, or windsor-loam, the holes of the bottom part, except that in which the nozzle of the bellows is received; blow the fire, and excite it with great force, adding now and then fresh fuel, that the vessel may never be naked at top. Having thus continued your fire in its full strength for three quarters of an hour, or a whole hour, take the vessel out of it, and strike the pavement on which it is set, that the small grains of iron that happen to be dispersed, may be collected into a regulus, which you will find after having broken the vessel.

*Preparations of IRON, in medicine, are, 1.* the crude filings, reduced to an impalpable powder, greatly recommended in female disorders.

2. The crocus martis. See CROCUS.

3. The flores martiales, or flowers of iron. See the article FLOS.

4. The sal martis, or salt of iron, which is prepared thus: mix together a quart of water, and eight ounces of the oil of vitriol; pour the oil of vitriol in by a little at a time: put the mixed liquor into a glass-vessel, and add to it four ounces of the filings of iron: when the ebullition is over, evaporate the liquor to a pellicle, and set it to shoot, there will then be a green vitriol or salt found in fair crystals; dry them for use.

This salt is one of the most powerful preparations of this metal; it opens obstructions of all kinds, strengthens the viscera, is an excellent medicine in cachexies, and destroys worms.

5. Tincture of iron, with spirit of salt, is made thus: take filings of iron, half a pound; Glauber's spirit of sea-salt, three pounds; rectified spirit of wine, three pints: digest the spirit of salt and the filings together, without heat, as long as the spirit will work upon them; then after the fæces have subsided, pour off the clear liquor, evaporate it to one pound, and to this add the spirit of wine.

This has the same virtues as the crocus martis. See the article CROCUS.

6. Chalybeate, or steel-wine, is made in the following manner: take filings of iron, four ounces; cinnamon and mace,

of each half an ounce ; of rhenish wine, two quarts ; infuse them a month, without heat, often shaking the vessel, and then filter it off for use.

This wine is an excellent stomachic and aperient ; a moderate glass may be drank once or twice a day, or it may be mixed in apozems of the aperient vegetables.

**Duties upon IRON.** Amy spanish, spruce, and swedish iron imported in any other ship or vessel than such as is english built, and of which the master, and at least three-fourths of the mariners are english, pays on importation, 2l. 17s. 10 $\frac{6}{100}$ d. the ton, and draws back on exportation, 2l. 14s. 6 $\frac{7}{100}$ d. The same imported in english-built ships, and so navigated, to pay on importation, 2l. 8s. 6 $\frac{1}{100}$ d. the ton, and draw back on exportation, 2l. 5s. 2 $\frac{2}{100}$ d. Iron slit or hammered into rods, commonly known by the name of rod-iron, pays on importation, 8s. 6 $\frac{4}{100}$ d. the hundred wt. and draws back on exportation, 8s. 7 $\frac{5}{100}$ d. Ditto from Ireland, pays 3s. 10 $\frac{2}{100}$ d. and draws back, 3s. 4 $\frac{5}{100}$ d. Iron drawn or hammered, less than three fourths of an inch square, pays on importation, 8s. 6 $\frac{4}{100}$ d. the hundred weight, and draws back on exportation, 8s. 7 $\frac{5}{100}$ d. Unwrought iron of Ireland, pays on importation, 1l. 6s. 11 $\frac{4}{100}$ d. the ton, and draws back on exportation, 1l. 3s. 7 $\frac{5}{100}$ d. Unwrought iron of all other places, not otherwise rated, imported in british ships, pays on importation, 2l. 8s. 6 $\frac{1}{100}$ d. the ton, and draws back on exportation, 2l. 5s. 2 $\frac{2}{100}$ d. and in foreign ships, pays on importation, 2l. 17s. 10 $\frac{6}{100}$ d. and draws back on exportation, 2l. 14s. 6 $\frac{7}{100}$ d. Iron-wares manufactured, not otherwise rated, or not prohibited by law, pay per hundred weight on importation, 12s. 4 $\frac{6}{100}$ d. and draw back on exportation, 11s. 5 $\frac{2}{100}$ d. Iron-ore the ton, pays on importation, 2s. 4 $\frac{72\frac{1}{2}}{100}$ d. and draws back on exportation, 2s. 1 $\frac{87\frac{1}{2}}{100}$ d. Old bushels, broken and cast iron, pays on importation, the ton, 11s. 11 $\frac{62\frac{3}{4}}{100}$ d. and draws back on exportation, 10 s. 9 $\frac{37\frac{1}{2}}{100}$ d. Backs for chimnies, small, the piece, pay on importation, 2s. 4 $\frac{52\frac{1}{2}}{100}$ d. and draw back on exportation, 2s.

2 $\frac{62\frac{1}{2}}{100}$ d. Backs for chimnies, large, the piece, pay on importation, 4s. 9 $\frac{6}{100}$ d. and draw back on exportation, 4s. 5 $\frac{2}{100}$ d. Bands for kettles, the hundred wt. pay on importation, 12s. 4 $\frac{6}{100}$ d. and draw back on exportation, 11s. 5 $\frac{2}{100}$ d. Fire irons, the groce, pay on importation, 1s. 11 $\frac{10}{100}$ d. and draw back on exportation, 1s. 8 $\frac{1}{100}$ d. More for every hundred weight on importation, 4s. 8 $\frac{2}{100}$ d. and draw back on exportation, 4s. 8 $\frac{2}{100}$ d. Hoops the hundred wt. pay on importation, 9s. 9 $\frac{8}{100}$ d. and draw back on exportation, 9s. 2 $\frac{2}{100}$ d. Stoves, the piece, pay on importation, 19s. 3d. and draw back on exportation, 16s. 10 $\frac{5}{100}$ d. More for every hundred weight on importation, 4s. 8 $\frac{2}{100}$ d. and draw back the same. Iron kettles, the piece, pay 1s. 2 $\frac{6\frac{1}{2}}{100}$ d. and

draw back, on exportation, the same ; and besides for every hundred weight on importation, 7s. 8 $\frac{4}{100}$ d. and draw back, on exportation, 6s. 9d.

Pig or bar-iron, from the british plantations in America, is imported free ; but all such iron must be stamped with a mark, denoting the colony, or place where it was made, and a certificate produced of the oath of the exporter, signed by two of the principal officers of such colony ; and the master, or commanding officer of the ship, or vessel, importing such iron, must make oath, that the iron so imported, is the same as that mentioned in the certificate.

**IRON-SICK**, in the sea-language, is said of a ship or boat, when her bolts or nails are so eaten with rust, and so worn away, that they occasion hollows in the planks, whereby the vessel is rendered leaky.

**IRON-WOOD**, *sideroxylum*, in botany. See the article **SIDEROXYLUM**.

**IRON-WORT**, *sideritis*, in botany. See the article **SIDERITIS**.

**IRONY**, in rhetoric, is when a person speaks contrary to his thoughts, in order to add force to his discourse ; whence, Quintilian calls it *diversiloquium*.

Thus, when a notorious villain is scornfully complemented with the titles of a very honest and excellent person ; the character of the person commended, the air of contempt that appears in the speaker, and the exorbitancy of the commendations, sufficiently discover the dissimulation or irony.

Ironical exhortation is a very agreeable kind of trope ; which, after having set the inconveniences of a thing in the clearest light, concludes with a feigned encouragement to pursue it. Such is that of Horace, when, having beautifully described the noise and tumults of Rome, he adds ironically,

Go now, and study tuneful verse at Rome!

**IROQUOIS**, the name of five nations in north America, in alliance with the british colonies. They are bounded by Canada on the north, by the british plantations of New-York and Pensilvania on the east and south, and by the lake Ontario on the west.

**IRRADIATION**, the act of emitting subtle effluvia, like the rays of the sun, every way. See **EFFLUVIA**.

**IRRATIONAL**, an appellation given to surd numbers and quantities. See the articles **NUMBER**, **QUANTITY**, and **SURD**.

**IRREGULAR**, something that deviates from the common forms, or rules ; thus we say an irregular fortification, an irregular building, an irregular figure, &c. See the articles **FORTIFICATION**, &c.

**IRREGULAR**, in grammar, such inflections of words as vary from the general rules ; thus we say, irregular nouns, irregular verbs, &c.

The distinction of irregular nouns, according to Mr. Ruddiman, is into three kinds, *viz.* variable, defective, and abundant ; and that of irregular verbs into anomalous, defective and abundant. See **ABUNDANT**, **DEFECTIVE**, &c.

**IRREGULAR**, among casuists, is applied to a person who is unqualified for entering into orders ; as being base-born, notoriously defamed, &c. and by that means rendered incapable of holding a benefice, or discharging any of the sacred functions.

**IRREGULAR BODIES**, are solids not terminated by equal and similar surfaces.

**IRREGULAR COLUMN**, in architecture, a column which does not only deviate from the proportions of any of the five orders, but whose ornaments, whether in the shaft or capital, are absurd and ill chosen.

**IRREPLEVABLE**, or **IRREPLEVISABLE**, in law, signifies any thing that neither may nor ought to be replevied. It is said, that it is against the nature of a distress for rent, to be irrepleviable.

**IRTI**, a great river, which runs from north to south through Russia, falls into

the river Oby, and makes part of the boundary between Asia and Europe.

**IRWIN**, a port-town of Scotland, in the bailiwick of Cunningham, situated at the mouth of the river Irwin, on the Firth of Clyde : west long.  $4^{\circ} 40'$ , north lat.  $55^{\circ} 35'$ .

**ISABELLA**, a fortress of the Austrian Netherlands, situated on the west side of the river Scheld, opposite to Antwerp, in east long.  $4^{\circ} 10'$ , north lat.  $51^{\circ} 15'$ .

**ISAIAH**, or *Prophecy of ISAIAH*, a canonical book of the Old Testament. Isaiah is the first of the four greater prophets, the other three being Jeremiah, Ezekiel, and Daniel. This prophet was of royal blood, his father Amos being brother to Azariah, king of Judah. The five first chapters of this prophecy relate to the reign of Uzziah ; the vision, in the sixth chapter, happened in the time of Jotham : the next chapters to the fifteenth, include his prophecies under the reign of Ahaz ; and those that were made under the reigns of Hezekiah and Manasseh, are related in the next chapters to the end. The style of this prophet is noble, sublime and florid. Grotius calls him the Demosthenes of the Hebrews. He had the advantage, above the other prophets, of improving his diction by conversing with men of the greatest parts and elocution, and this added a sublimity, force, and majesty to what he said. He impartially reproved the vices of the age in which he lived, and openly displayed the judgments of God that were hanging over the jewish nation ; at the same time denouncing vengeance on the Assyrians, Egyptians, Ethiopians, Moabites, Edomites, Syrians, and Arabians, who were instrumental in inflicting those judgments. He foretold the deliverance of the Jews from their captivity in Babylon, by the hands of Cyrus king of Persia, an hundred years before it came to pass ; but the most remarkable of his predictions are those concerning the Messiah, in which he not only foretold his coming in the flesh, but all the great and memorable circumstances of his life and death.

**ISATIS**, **WOAD**, in botany, a genus of the *tetradynamia filiquosa* class of plants, the corolla whereof consists of four cruciform, oblong, obtuse, patent petals, turning gradually smaller towards the ungues : the fruit is an oblong, lanceolato-obtuse, compressed, small pod, containing two valves, and consisting only of



of one cell : the seed is single, ovated, and contained in the center of the fruit. This plant is much used by dyers, as also in medicine, as an astringent, a vulnerary, and for stopping the menses.

**ISCHÆMUM**, **SCHOENANTH**, in botany, a genus of plants, thus characterized by Scheukzer : the male and female flowers are separate, but stand near each other ; the male is a small bivalve glume, placed on the calyx of the female flower, which is a biflorous glume : the seed is single, and involved in the calyxes and corollulæ.

The whole plant is of a fragrant aromatic smell, and is accounted cephalic, but little used at present.

**ISCHIA**, an island in the Neapolitan Sea, situated fifteen miles west of the city of Naples, in 14° 40', east long. and 41° north lat..

**ISCHIADIC**, in anatomy, a name given to two crural veins, called the greater and lesser ischias. See **VEIN**.

It signifies also a disease or pain of the hip ; being a species of arthritis, seated in the joint of the hip, and commonly called sciatica. See the article **SCIATICA**.

**ISCHIAS**, one of the ischiatic veins. See **VEIN**, and the preceding article.

**ISCHIUM**, in anatomy, the name of a bone described under the article **INNOMINATA ossa**. See **INNOMINATA**.

**ISCHURY**, *ισχουρία*, in medicine, a disease consisting in an entire suppression of urine. As the causes of an ischury are various, they ought, according to Heister, to be carefully distinguished from each other. When it proceeds from an inflammation of the kidneys, the pain and heat are principally in that region attended with a fever ; if from a stone in the kidneys, it is accompanied with vomiting ; if from a stone in the bladder, there is a violent pain in the bladder, which is extended to the very extremity of the urethra ; a mucus, or pus, is excreted with pale urine ; and upon proper examinations, the stone may be felt : but the most certain sign, is searching the bladder with a catheter. When this disorder arises from a stone in the urethra, it may be easily felt. If from an inflammation of the neck of the bladder, there is a tumour and pain in the perinæum, as often as the place is touched ; but it may be best perceived by thrusting the finger into the anus, and turning it up towards the bladder, for a tumour will be perceived by the physician, and by the

patient a burning and pressing pain ; and when a catheter is introduced into the urethra, an impediment will be felt near the neck of the bladder, which will hinder it from proceeding farther. See the article **CATHETER**.

When the urinous passages are obstructed by solid bodies, that is, the pelvis of the kidneys, the ureters or neck of the bladder, or the urethra, from a stone contained therein ; if it be small, those diuretics will be proper which are mentioned in a fit of the gravel or stone, to which may be added a decoction of of eryngo-root and epsom-salt, or selters-waters, taken often therewith. But if the stone is large and cannot be excreted by this means, strong diuretics are highly hurtful ; and it must be cured by section. See the article **LITHOTOMY**.

If the urine is suppressed from an inflammation of the kidneys or bladder, recourse must be had to the treatment and medicines prescribed for the disorders under the article **INFLAMMATION**.

When the spongy substance of the urethra is swelled with blood, and as it were inflated, a copious bleeding is the principal remedy. See **GONORRHOEA**.

When a spasm affects the neck of the bladder, it must be treated with antispasmodic powders, diuretic waters, and infusions with emulsions and lenient oils now and then, such as salad oil, oil of sweet almonds, poppy or linseed ; externally, cataplasms, ointments, clysters, and baths of the emollient and demulcent kind, with gentle opiates. See **SPASM**.

If the disease proceeds from the palsy, as sometimes happens in old persons, wherein there is no pain, the belly and perinæum must be treated with frictions and fomentations of strengthening, nervine and spirituous remedies, with cataplasms of onions, and other stimulators applied to the bladder, with clysters of the same sort of herbs. When the urine is very urgent, it must be evacuated by a catheter, which must be repeated as often as occasion requires. See **PALSY**.

If the disorder proceeds from blood remaining in the bladder, or its neck, the concretion is to be resolved and expelled with warm infusions of digestive herbs drank like tea ; such as ground-ivy, arnica, chervil, with tincture of tartar, liquor of the terra foliata of tartar, with digestive powders of crabs-eyes, saturated with the juice of oranges or lemons, sperma ceti, &c. but if all these fail, the

catheter

catheter is to be introduced into the neck of the bladder, to break the concretion, and evacuate the urine. See the article **RESOLVENTS**, &c.

When there is an ulcer in the bladder, infusions of vulnerary absorbent roots and herbs must be given, with mucilages and soft balsamics, especially balsam of Mecca, with a moderate use of quick-silver, especially if the case is venereal. See the article **ULCER**.

If there is a difficulty of urine in pregnant women, towards the last months, the best remedy is to ease the pressure on the part; but if that will not do, to use a catheter.

Lastly, if it proceeds from a swelling of the prostrate glands, or it becomes scirrhus, it must be treated as such; but if these remedies fail, the bladder must be pierced with a trocar; and when the perforation is made, the water must be evacuated as in the dropsy. This instrument must be left in the wound, and fastened in such a manner, that it does not fall out, so that the urine may be made as often as there is occasion. It is a troublesome operation, but the only one left.

**ISELASTICS**, a kind of games, or combats, celebrated in Greece and Asia, in the time of the roman emperors.

The victor at these games had very considerable privileges conferred on him, after the example of Augustus and the Athenians, who did the like to conquerors at the olympic, pythian, and isthmian games. They were crowned on the spot immediately after their victory, had pensions allowed them, were furnished with provisions at the public cost, and were carried in triumph to their country.

**ISENACH**, a town of Germany in the circle of Upper Saxony, situated in east long.  $10^{\circ} 12'$ , north lat.  $51^{\circ}$ .

**ISENARTS**, a town of Germany, in the circle of Austria, and dukedom of Stiria, situated thirty-five miles north-west of Gratz.

**ISERNIA**, a town of Naples, in the province of Molise, situated in east long.  $15^{\circ} 15'$ , north lat.  $41^{\circ} 36'$ .

**ISIA**, feasts and sacrifices antiently solemnized in honour of the goddess Isis.

The Isia were full of abominable impurities, and for that reason those who were initiated, were obliged to take an oath of secrecy: they held for nine days successively, but were so abominable, that

the senate abolished them at Rome, under the consulship of Piso and Gabinius.

**ISINGLASS**, *ichthyocolla*, in the materia medica, &c. See **ICHTHYOCOLLA**.

**ISIS**, in botany, the name by which Linnaeus calls the coral plant. See **CORAL**.

**ISLAND**, a tract of dry land, encompassed with water, in which sense it stands contradistinguished from continent, or terra firma. See **CONTINENT**.

Several naturalists are of opinion, that the islands were formed at the deluge: others think, that there have been new islands formed by the casting up of vast heaps of clay, mud, sand, &c. others think they have been separated from the continent by violent storms, inundations, and earthquakes. These last have observed, that the East-Indies, which abound in islands more than any other part of the world, are likewise more annoyed with earthquakes, tempests, lightnings, volcanos, &c. than any other part. Others again conclude, that islands are as antient as the world, and that there were some at the beginning, and among other arguments, support their opinion from Gen. x. 5. and other passages of scripture.

Varenius thinks, that there have been islands produced each of these ways. St. Helena, Ascension, and other steep rocky islands, he supposes to have become so by the sea's over-flowing their neighbouring champaigns: but by the heaping up huge quantities of sand, and other terrestrial matter, he thinks the islands of Zealand, Japan, &c. were formed. Sumatra and Ceylon, and most of the East-indian islands, he thinks, were rent off from the main land; and concludes, that the islands of the Archipelago were formed in the same way, imagining it probable, that Deucalion's flood might contribute towards it. The antients had a notion that Delos, and some other few islands, rose from the bottom of the sea, which, how fabulous soever it may appear, agrees with later observations. Seneca takes notice, that the island Therasia rose thus out of the Ægean sea in his time, of which the mariners were eyewitnesses. They had also an opinion that there are some islands which swim in the sea. Thales, indeed, thought that the whole earth which we inhabit floated in the sea: but floating islands are not only probable, but well attested. See the article **FLOATING**.

**ISLE**,

**ISLE**, in general, denotes the same with island, but frequently used in a diminutive sense.

**ISLE DE DIEU**, an island in the Bay of Biscay, on the coast of France, situated fourteen miles west of the coast of Poitou.

**ISLE of France**, a province of that kingdom, in which the capital city of Paris is situated, being bounded by Picardy on the north, by Champain on the east, by Orleans on the south, and by Normandy on the west.

**ISLES**, in architecture, denote the sides or wings of a building. See **BUILDING**.

**ISLOCK**, or **ILOCK**. See **ILOCK**.

**ISNARDIA**, in botany, a genus of the *tetrandria monogynia* class of plants; having no corolla: the fruit is formed of the square base of the cup: it has four cells, and in them a few seeds of an oblong figure.

**ISNY**, a free imperial city of Germany, in the circle of Swabia, situated in east long.  $10^{\circ}$  north lat.  $47^{\circ} 36'$ .

**ISOCHRONAL**, **ISOCHROME**, or **ISOCHRONOUS**, is applied to such vibrations of a pendulum, as are performed in the same space of time, as all the vibrations or swings of the same pendulum are, whether the arches it describes be longer or shorter: for when it describes a shorter arch, it moves so much the slower, and when a long one proportionably faster.

**ISOCHRONAL LINE**, that in which a heavy body is supposed to descend without any acceleration. See **ACCELERATION**.

Mr. Leibnitz, in the *Acta Erud.* Lips. for Feb. 1689, shews, that an heavy body with a degree of velocity acquired by the descent from any height may descend from the same point by an infinite number of isochronal curves, all which are of the same species, differing from one another only in the magnitude of their parameters: such are all the quadrato-cubical paraboloids, and consequently similar to one another. He shews also there, how to find a line in which a heavy body descending shall recede uniformly from a given point, or approach uniformly to it.

**ISOLA**, a port-town and bishop's see of the hither Calabria, fifteen miles south of St. Severino.

**ISOMERIA**, a term sometimes used for the reduction of equations. See the article **EQUATION**.

**ISOPERIMETRICAL FIGURES**, in geometry, are such as have equal peri-

eters, or circumferences. See the article **CIRCUMFERENCE**.

1. Of isoperimetrical figures, that is the greatest that contains the greatest number of sides, or the most angles, and consequently a circle is the greatest of all figures that have the same ambit as it has. See the article **CIRCLE**.

2. Of two isoperimetrical triangles, having the same base, whereof two sides of one are equal, and of the other unequal, that is the greater whose two sides are equal. See **TRIANGLE**.

3. Of isoperimetrical figures, whose sides are equal in number, that is the greatest which is equilateral and equiangular. From hence follows that common problem of making the hedging or walling that will wall in one acre, or even any determinate number of acres,  $a$ , fence or wall in any greater number of acres whatever  $b$ . In order to the solution of this problem, let the greater number  $b$  be supposed a square. Let  $x$  be one side of an oblong, whose area is  $a$ ; then will  $\frac{a}{x}$  be the other side; and  $2\frac{a}{x} + 2x$

will be the ambit of the oblong, which must be equal to four times the square root of  $b$ ; that is,  $2\frac{a}{x} + 2x = 4\sqrt{b}$ .

Whence the value of  $x$  may be easily had, and you may make infinite numbers of squares and oblongs that have the same ambit, and yet shall have different given areas. See the operation:

Let  $\sqrt{b} = d$

$$\text{Then } \frac{2a + 4xx}{x} = 4d$$

$$a + 2xx = 2dx$$

$$2xx - 2dx = -a$$

$$xx - dx = -\frac{a}{2}$$

$$xx - dx + \frac{1}{4}dd = -\frac{a}{2} + \frac{1}{4}dd$$

$$x = \sqrt{-\frac{a}{2} + \frac{1}{4}dd + \frac{1}{4}d^2}$$

Thus if one side of the square be 10; and one side of an oblong be 19, and the other 1: then will the ambits of that square and oblong be equal, viz. each 40, and yet the area of the square will be 100, and of the oblong but 19.

**ISOPYRUM**, in botany, a genus of the *polyandria digynia* class of plants, the corolla of which consists of five equal, ovated and patent petals: the fruit is composed of two crooked, lunated pods, with

with only one cell in each, containing numerous seeds.

**ISOCELES-TRIANGLE**, in geometry, one that has two equal sides, as A B C (pl. CXLVIII. fig. 2.) where the side A B is equal to A C.

In every iscoceles-triangle, the angles A B C, A C B, subtended by the equal sides, are equal; and a line A D bisecting the base B C in D, is perpendicular to it, as is easily demonstrated. See the article **TRIANGLE**.

**ISPAHAN**, or **SPAHAWN**, the capital city of Eyrac Agem, and of all Persia: it is of an oval form, and twelve miles in circumference: east long. 50°, north lat. 32° 30'.

**ISPIDA**, the **KING-FISHER**, in ornithology, a genus of the picæ-order of birds, with a beak of a trigonal figure, somewhat arcuated, compressed, and its two claps equal: there are four toes on each foot, with only one of them placed behind.

This is a very numerous genus, the species of which are chiefly distinguished by their size and different colours.

**ISSUE**, in law, has several significations, it being sometimes taken for the children begotten between a man and his wife; sometimes, for profits arising from amercements and fines; and sometimes, for the profits issuing out of lands or tenements: but this word generally signifies the conclusion, or point of matter, that issues from the allegations and pleas of the plaintiff and defendant in a cause tried by a jury of twelve men.

There are two kinds of issues in relation to causes, that upon a matter of fact, and that upon a matter of law: that of fact is where the plaintiff and defendant have fixed upon a point to be tried by a jury: and that in law is, where there is a demurrer to a declaration, &c. and a joinder in demurrer, which is determinable only by the judges. Issues of fact are either general or special: they are general, when it is left to the jury to find whether the defendant has done any such thing as the plaintiff has alledged against him; and special, where some special matter, or material point alledged by the defendant in his defence, is to be tried. General issue also signifies a plea in which the defendant is allowed to give the special matter in evidence, by way of excuse or justification; this is granted by several statutes, in order to prevent a prolixity in pleading, by allowing the defendant

to give any thing in evidence, to prove that the plaintiff had no cause for his action.

In real actions, the issues are triable by a jury of the county in which the cause of action arises. Issues are to be certain and single, and joined upon the most material point in question, so that the whole matter in dispute between the parties may be tried. On a joint action of trespass by many persons, only one issue must be joined; and where several offences are charged against a defendant, he ought to take all but one by protestation, and then offer an issue on that one, and no more; though in an action for damages, every part, according to the loss the plaintiff has sustained, is to be put in issue. Where a good issue is joined between the parties, it cannot afterwards be waved, without the consent of both parties: but where the defendant pleads the general issue, and does not enter the same, he may within four days of term wave such issue, and plead specially: so if a defendant pleads in abatement, he may any time after wave his special plea, and plead the general issue, except a rule be made for him to plead as he will stand by it: but in case the plaintiff omits entering the issue the term it is joined, the defendant in the first five days of the next term, may alter his plea, and plead de novo: and when the plaintiff will not try the issue, after the same is joined, within the time required by the course of law, the defendant may give him a rule to enter it, and if he does not then try it he shall be nonsuited.

**ISSUES on sheriffs**, are such amercements and fines to the crown, as are levied out of the issues and profits of the lands of sheriffs, for their faults and neglects: but these issues, on shewing a good and sufficient cause, may be taken off before they are estreated into the exchequer.

Issues are also leviable upon jurors, for non-appearance; though upon a reasonable excuse, proved by two witnesses, the justices may discharge the same.

**ISSUES**, in surgery, are little ulcers made designedly by the surgeon in various parts of the body, and kept open by the patient, for the preservation or recovery of his health.

The parts in which issues are generally made, are either the upper part of the head; the neck; the arms, betwixt the biceps and deltoide muscle, and near the insertion of the last; in the thigh, especially

especially within side, immediately above the knee, in a cavity easily felt by the fingers; and, lastly, in the legs, on their interior side, in a cavity immediately below the knee.

There are several methods of making issues, but the most ready one is by incision, which is performed thus: first mark the proper place with ink; then elevating the integuments between the thumb and fore-finger of the surgeon and an assistant on each side, you next proceed to make an incision thro' them, either with the scalpel or lancet, big enough to admit a pea, which being inserted and covered with a plaster and compress, nothing more than your roller is wanting to compleat the operation. Thus by cleaning and dressing the wound every morning and evening with a fresh pea, it by degrees, in a day or two, degenerates into a little ulcer, discharging daily a quantity of purulent matter, which should be carefully cleansed or wiped off at every dressing.

There is a second method of making issues by wounding the skin with an actual cautery, or red hot iron, which is usually included in sort of capsula, or case of iron (plate CXLIX. fig. 2.) to conceal it from terrifying the patient. When the case B B is fixed upon the proper part for the issue, the red-hot iron C, is then pressed down upon the integuments, and the eschar, or burn, is next to be dressed with fresh butter or basilicon, till by repeating the dressing every day, it separates, and then the ulcer formed, is to be filled with a pea, and dressed as before.

The third method of making issues is by the application of potential cauteries, or corroding medicines; in order to which a piece of plaster is first perforated, and then applied, so as its aperture may cover the place marked with ink for the issue: a piece of the caustic is then put into the aperture of the plaster, and retained close down upon the skin, with some scraped lint, a small compress, and a large plaster; and lastly, with a larger compress and bandage. The patient is then to be ordered to rest for about six or eight hours, more or less, according to the strength of the caustic, which time being elapsed, and the dressings removed, the eschar is to be treated as before directed in an actual cautery.

In which ever of these methods the issue is made, it must be dressed at least twice

every day, especially if it runs well, and in the summer-season: and at each dressing you must put in a fresh pea, and cover it with a clean plaster, or a piece of waxed paper or silk, or an ivy-leaf retained with compress and bandage. But the deligation for issues is much more commodiously performed with a leatheren swath, fastened by clasps, than by a circular linnen-roller. In this manner issues are to be kept open, till the patient is recovered of the disorder for which they were made.

Issues are chiefly made for various disorders in the head, eyes, ears, teeth, the sciatica, and other painful disorders, which are this way frequently relieved or cured. But in stubborn disorders it is frequently necessary to make two or more issues to produce any considerable effect, as one in each arm, or in one arm and leg of the same side.

In order to close an issue, little more is required than to discharge the pea, and to refrain from putting in any more, by which means alone it will close up in a short time: but if any proud flesh should arise, it may be amputated, or else removed with burnt alum. Lastly, it is observable, that when the issues of people far advanced in years cease to make their wonted discharge, and turn of a livid and blackish hue, it is a sign that they are invaded by some desperate disorder, and that life itself is very near its period.

**ISTHMA, or ISTHMIAN GAMES,** *ισθμια*, one of the four solemn games which were celebrated every fifth year in Greece; so called from the corinthian isthmus, where they were kept.

These games, according to some, were instituted in honour of Palæmon, or Melicertes the son of Athamas king of Thebes, and Ino. Others report, that they were instituted by Theseus, in honour of Neptune. Others again are of opinion, that there were two distinct solemnities observed in the isthmus, one to Melicertes, and another to Neptune. These games were held so sacred and inviolable, that when they had been intermitted for some time, through the oppression and tyranny of Cypselus king of Corinth, after the tyrant's death the Corinthians, to renew the memory of them, employed their utmost power and industry. The victors were rewarded with garlands of pine-leaves; afterwards, parsley was given them: but at length, the pine was resumed, and to this was

added

added the reward of 100 silver drachmæ. These games were so celebrated, and the concourse at them so great, that only the principals of the most remarkable cities, could have place in them. The Athenians had only as much room allowed them as the sail of a ship, which they sent yearly to Delos, could cover.

**ISTHMUS**, in geography, a narrow neck of land, that joins two continents, or joins a peninsula to the terra firma, and separates two seas. The most celebrated isthmuses are those of Panama, or Darien, which joins north and south America; and that of Suez, which connects Asia and Africa; that of Corinth, of Crim Tartary, &c.

**ISTRIA**, a peninsula in the north part of the gulph of Venice, bounded by Carniola, on the north; and on the south, east, and west, by the sea.

**ITALIAN**, the language spoken in Italy. See the article **LANGUAGE**.

This tongue is derived principally from the latin; and of all the languages formed from the latin, there is none which carries with it more visible marks of its original than the italian. It is accounted one of the most perfect among the modern tongues, containing words and phrases to represent all ideas, to express all sentiments, to deliver ones self on all subjects, to name all the instruments and parts of arts, &c. It is however complained, that it has too many diminutives and superlatives, or rather augmentatives, but without any great reason: for if these words convey nothing farther to the mind than the just ideas of things, they are no more faulty than our pleonasm and hyperboles. The language corresponds to the genius of the people; they are slow and thoughtful, and accordingly their language runs heavily, though smoothly, and many of their words are lengthened out to a great degree. They have a great taste for music, and to gratify their passion this way, have altered abundance of their primitive words, leaving out consonants, taking in vowels, softening and lengthening out their terminations for the sake of the cadence. Hence the language is extremely musical, and succeeds better than any other in operas, and some parts of poetry: but it fails in strength and nerves: hence also, a great part of its words borrowed from the latin, became so far disguised, that they are not easily known again.

**ITALIAN COINS**. See **COIN**.

**ITALIAN MEASURES**. See **MEASURE**.

**ITALIC CHARACTERS**, in printing. See the article **LETTER**.

**ITALIC**, or **ITALIAN HOURS**, the twenty-four hours of the natural day, accounted from the sun-setting of one day, to the same again the next day. See **HOURL**.

**ITALIC SECT**, the name of a sect of ancient philosophers, founded by Pythagoras; so called, because that philosopher taught in Italy, spreading his doctrine among the people of Tarentum, Metapontus, Heraclea, &c. This sect divided itself into four others, viz. the **HERACLITIC**, **ELEATIC**, &c.

**ITALY**, a country situated between seven and nineteen degrees east long. and between thirty-eight and forty-seven degrees north latitude, bounded by Switzerland, and the Alps, which separate it from Germany, on the north; by the gulph of Venice, on the east; by the Mediterranean Sea, on the south; and by the same Sea and the Alps, which separate it from France, on the west; and if we include Savoy, which lies indeed on the west side of the Alps, between Italy and France, we must extend it a degree farther west: this is usually described however with Italy, as it is contiguous to Piedmont, and has the same sovereign, being a province of the king of Sardinia's dominions. Italy is said to resemble a boot, and is in length from north-west to south-east 600 miles; the breadth is very unequal; in the north, which may be called the top of the boot, it is 400 miles broad from east to west, in the calf of the leg, or middle, it is about 120 miles broad; and towards the south, about the instep, eighty miles broad; and comprehends the following countries or subdivisions. 1. In the north are the duchies of Savoy, Piedmont, and Montserrat; the territories of Genoa; the duchies of Milan, Mantua, Parma, Modena, and the territories of Venice. 2. In the middle of Italy, are the duchy of Tuscany, the pope's dominions, and the state of Lucca. 3. And in the south is the kingdom of Naples.

**ITCH**, a cutaneous disease, arising from a corruption of a serous lymphatic matter, sometimes attended with mild, sometimes with more obstinate and dangerous symptoms.

The itch of the milder sort appears either with moist or dry pustules at first about the joints, and from thence spreads by

by degrees over all the body, the head only excepted. In the moist sort, to which children and the sanguineo-phlegmatic are most subject, the pustules are more full of a purulent matter, attended with a slight inflammation, which is manifest from a redness that appears about them, till it suppurates. The dry sort attacks chiefly those that are lean, old, or are of a melancholico-choleric constitution. In these the pustules are much less, and excite a most intolerable itching, especially in the night-time. The most usual places where the eruptions appear very numerous, and the itching is greatest, are between the fingers, on the arms, hams, and thighs.

This disease is truly and properly a disease of the skin, because it often is safely cured by topics alone, if timely applied. It is contagious, and may be caught by drawing on a glove or stocking, wiping on the linnen, or lying in sheets, after persons infected with this malady. Some think it owing to an impurity in the serum, and some to animalcula; but however that be, it often affects such as have been long kept in prison, who lead unactive lives, and are used to live in a stutish, nasty manner; or who constantly eat fish or flesh dried in the smoke or sun, and use any other unwholesome food or drinks; or who live in a cold, moist, and cloudy air, which, hindering a free perspiration, causes a stagnation of humours in the superficies of the body, which are for that reason liable to corrupt.

The milder sort of itch is no way dangerous, and very easy to cure: but the moist kind is more easy than the dry. While it is recent and superficial, it much sooner yields to remedies than when it is deep, and has infected the mass of blood. And the case is still worse, if there be a fault in the viscera: it is more difficult in old persons, than in young; in a leucophlegmatic, or hydropical disposition, as also in a very dry hectic one, it is hard to cure; and when it becomes universal, it may bring on the leprosy.

The patient should avoid shell-fish, and all salted and high-seasoned meats; as also wine, spirituous liquors, strong-beer, and every thing else that may inflame the blood: for this reason a slender diet is best, unless perspiration be obstructed. If the body is plethoric, the cure is begun by bleeding, and afterwards by purging; but instead of purg-

ing, it is common to give flowers of sulphur with good success. Willis, and many others, have a great opinion of the efficacy of sulphur used both internally and externally; to which Turner assents, except in hectic and consumptive cases; but Shaw thinks it not to be depended on, when outwardly used: yet it is very certain, that poor people find a great deal of benefit who drink it inwardly with milk, and use it outwardly with butter or hog's lard.

Juncker, from Stahl, calls the following things specifics against the acrimony of the itch, taken internally, *viz.* sulphur with nitre and arcanum duplicatum, balsam of sulphur with oil of sweet almonds, tincture of sulphur, and crude antimony. Outwardly he advises mercurial ointments, and sulphureous lixiviums; but in the dry itch, he thinks baths more proper made of the root of burdock, the sharp-pointed dock, and mineral fountain-water. Turner prefers the sal. tart. to most other remedies, it thoroughly purging and cleansing the blood if taken inwardly; and made into a lixivium with spring-water, is an excellent wash outwardly. Hartman, in an obstinate itch, proposes a diaphoretic of the white flowers of antimony to be taken twenty days together.

When the blood is thought to be foul, it will be proper to use diet-drinks of the roots of china, sarsaparilla, oxylapathum, scorzonera, chichory, glycyrrhiza, poly-podium, the barks of saffrafas, cinnamon, and the like.

The most stubborn itch will generally yield to the following ointment, if proper evacuations have been premised. Take of quicksilver, three drams; native cinabar, one dram; venice-turpentine, half a dram; hog's lard, half an ounce; oil of sweet almonds, two drams. Mix and divide this into eight equal parts, one of which is to be rubbed into the legs and arms every other night, or at greater intervals, if there are any signs of salivation: great care must be taken that the patient gets no cold, while he uses this medicine; if he feels any griping pains, or if his breath begins to stink, the use of it is immediately to be suspended. It has been a very common practice to cure the itch by quicksilver-girdles, but Turner thinks them too hazardous to be brought into regular practice. See the article GIRDLE.

If this disease should prove so stubborn

as not to give way to the most powerful of the preceding methods, recourse must be had to salivation as the dernier resort. See the article SALIVATION.

But notwithstanding these opinions, Dr. Mead affirms, that neither cathartics nor sweetners of the blood are of any service in this disease; that the whole management of it consists in external applications for destroying the corroding worms, which he takes to be the true cause of the disease. For, he says, that there are certain insects to very small, as hardly to be seen without the assistance of a microscope, which deposit their eggs in the furrows of the cuticle, as in proper nests, where, by the warmth of the place, they are hatched in a short time, and the young ones coming to full growth, penetrate into the cutis, and gnaw and tear the fibres, which cause an intolerable itching; that while they burrow under the cuticle, and lay their eggs in different places, they spread the disease.

This was first discovered by Dr. Bonomo, and by him communicated to the celebrated Redi of Florence; and Dr. Mead having met with Bonomo's letter upon this subject in Italy, made an abstract of it, and communicated it to the Royal Society.

The doctor advises, that the patient should first go into a warm bath, and then have the parts affected every day anointed with ointment of sulphur, or the ointment with precipitate of mercury.

**ITINERANT JUDGES**, a name formerly given to those judges who were sent into several counties to hear causes. See the article JUDGE.

**JUBILEE**, a time of public and solemn festivity among the antient Hebrews.

This was kept every fiftieth year: it began about the autumnal equinox, and was proclaimed by sound of trumpet throughout all the country. At this time all slaves were released, all debts annihilated, and all lands, houses, wives and children, however alienated, were restored to their first owners. During this whole year all kind of agriculture was forbidden, and the poor had the benefit of the harvest, vintage, and other productions of the earth, in the same manner as in the sabbatic, or seventh year. As this was designed to put the Israelites in mind of their Egyptian servitude, and to prevent their imposing the like upon their brethren, it was not observed by the gentile profelytes.

The Christians, in imitation of the Jews, have likewise established jubilees, which began in the time of pope Boniface VIII. in the year 1300, and are now practised every twenty-five years; but these relate only to the pretended forgiveness of sins, and the indulgences granted by the church of Rome: together with the privilege of performing a thousand frolics in masquerade. The ceremony of the jubilee observed at Rome, begins in the following manner: the pope goes to St. Peter's church, to open the holy gate, which is walled up, and opened only on this occasion; and, holding a golden hammer in his hand, he knocks at the gate three times, repeating these words, *aperite mihi portas justitie, &c. Open to me the gates of righteousness; I will go into them, and I will praise the Lord*, Psal. cxviii. 19. upon which the masons fall to work, and break down the wall that stops up the gate: which done, the pope kneels down before it, and the penitentiaries sprinkle him with holy water. Then, taking up the cross, he begins to sing *te deum*, and enters the church, followed by the clergy. In the mean time, three cardinal-legates are sent to open the three other holy gates which are in the churches of St. John of Lateran, St. Paul, and St. Mary the Greater. When the holy year is expired, the holy gates are shut in this manner: the pope, after he has blessed the stones and mortar, lays the first stone, and leaves there twelve boxes of gold and silver medals; after which the holy gates are walled up as before, and continue so till the next jubilee.

**JUCATAN, or YUCATAN**, a peninsula of Mexico, situated between 89° and 94° west long. and between 16° and 21° north lat.

Its chief town is Campeachy. See the article CAMPEACHY.

**JUDÆ AURICULA**. See AURICULA.

**JUDAICUS LAPIS**, in the materia medica, the petrified spine of an echinus. See the article JEW'S STONE.

**JUDAISM**, the religious doctrines and rites of the Jews. See JEWS.

**JUDAS'S TREE**, *siliquastrum*, in botany. See the article SILIQUASTRUM.

**JUDDOCK**, in ornithology, the english name of a small species of snipe, called also the ged or jack-snipe, and by authors *gallinago minima*.

**JUDE**, or *the general epistle of JUDE*, a canonical book of the New Testament, written against the heretics, who by their disorderly



disorderly lives and impious doctrines, corrupted the faith and good morals of the Christians. St. Jude draws them in lively colours, as men given up to their passions, full of vanity, conducting themselves by worldly wisdom, and not by the spirit of God.

In the early ages of christianity, several rejected this epistle because the apocryphal books of Enoch and the ascension of Moses are quoted in it. Nevertheless, it is to be found in all the antient catalogues of the sacred writings; and Clement of Alexandria, Tertullian and Origin, quote it as written by Jude, and reckon it among the books of sacred scripture.

**St. JUDE'S DAY**, the same with that of St. Simon. See the article **SIMON**.

**JUDEA**, or **PALESTINE**. See **PALESTINE**.

**JUDENBURG**, a city of Stiria, in Germany: east long. 15°, north lat. 47° 22'.

**JUDGE**, a chief magistrate of the law, appointed to hear criminal causes, to explain the laws, and to pass sentence according to the verdict brought in by the foreman of the jury. See **JURY**.

A judge, on his being created, takes an oath of office, that he will serve the king, and indifferently administer justice to all men, without respect of persons; that he will take no bribe; give no counsel, where he is a party; nor deny right to any, even though the king by his letters, or by express words, command the contrary; and that he may have no temptation to break his oath, he enjoys his office and a settled salary for life, and it is not in the power of the crown to deprive him of either. He is to execute his office in person, and cannot act by a deputy, nor transfer his power to another: yet where there are several judges in a court of record, the act of any one of them is effectual, provided their commission does not require more: so likewise what is carried by a majority present, is the act of the court: but where they are equally divided in opinion, the cause is to be removed into the exchequer-chamber, and for that purpose a rule is to be made, and the record certified, &c. Some things done by judges at their chambers, are accounted as done by the court: and that they may be prepared to hear what is to come before them, they are to have a paper of the causes to be heard, sent to them by the attorneys the day before they are spoken to; that if upon reading the record of a

cause any special matter that arises should appear doubtful, they may satisfy themselves by consulting books.

To support their dignity and authority, the judges of the courts of record are exempted from all prosecutions whatsoever, except in parliament, where alone they may be punished for any thing they have done amiss in their own courts as judges: but yet if a judge should so far forget his dignity as to turn solicitor in a cause which he is to judge, and extrajudicially tamper with witnesses, or attempt to work upon jurors, he may be dealt with in a manner suitable to the character to which he is to judge, and degraded himself. As the judge is the substitute of the king, and is designed to distribute that justice which he cannot administer in person, he cannot be challenged like a jury, nor have any action brought against him for what he acts as a judge: while he is on the bench his person is in a manner sacred, so that to kill a judge of any of the superior courts of Westminster, or of assize, on the place of administering justice, is treason; and drawing a weapon upon him in any of the courts of law, is to be punished with the loss of the right hand, the forfeiture of lands and goods, and perpetual imprisonment. On the other hand, a judge cannot sit as judge in his own cause: if he is guilty of taking a bribe, he is punishable by loss of office, fines and imprisonment; and if a judge, who has no jurisdiction, passes judgment of death, and his sentence is executed, both he, and the officer who executes it, is guilty of felony.

*Itinerant JUDGES*. See **ITINERANT**.

*Book of JUDGES*, a canonical book of the Old Testament, so called from its relating the state of the Israelites under the administration of many illustrious persons who were called judges, from their being both the civil and military governors of the people, and who were raised up by God upon special occasions; after the death of Joshua, till the time of their making a king. In the time of this peculiar polity, there were several remarkable occurrences, which are recorded in this book. It acquaints us with the gross impiety of a new generation which sprung up after the death of Joshua, and gives us a short view of the dispensations of heaven towards this people, sometimes relieving and delivering them, and at others, severely chastising them by the hands of their enemies.

The book of judges is usually divided into two parts: the one containing the history of the judges from Othniel to Sampson; which ends with the sixteenth chapter: the other containing several memorable actions, which were performed in or about the time of the judges, from the seventeenth chapter to the end of the book. The author of this book is wholly unknown; some ascribe it to Samuel, others to Hezekiah, and others to Ezra.

**JUDGMENT**, among logicians, a faculty or rather act of the human soul, whereby it compares its ideas, and perceives their agreement or disagreement. See the article **KNOWLEDGE**.

Not satisfied with the bare view and contemplation of its ideas, the mind assembles them together, and compares them one with another. In this complicated view of things, it readily discerns that some agree, and others disagree; and accordingly joins or separates them. Thus upon comparing the idea of two added to two, with the idea of four, we at first glance perceive their agreement, and pronounce them equal. Again, that white is not black, and that four and two do not make eight, are truths the mind as readily perceives.

This is the first and simplest act of the mind, in determining the relations of things; when by a bare attention to its own ideas, comparing any two of them together, it can at once see how far they are connected or disjointed. The knowledge thence derived is called intuitive, as requiring no pains or examination; and the act of the mind assembling its ideas together, and joining or disjointing them, according to the result of its perception, is what logicians call judgment. See the articles **IDEA**, **PERCEPTION**, **KNOWLEDGE**, &c.

In common discourse, however, the term judgment is seldom confined to self-evident truths; but rather signifies those conjectures that we form, which do not admit of undoubted certainty, and where we are left to determine by comparing the various probabilities of things. Thus a man of sagacity, who seldom mistakes in the opinions he frames of characters and actions, is said to judge well, or think judiciously. Hence it might not be improper to change the common names of the two first operations of the mind, calling the one simple apprehension, and the other intuition. See the articles **APPREHENSION** and **INTUITION**.

**JUDGMENT**, in law, the sentence of the judges upon a suit, &c.

Judgment may be given not only upon the trial of the issue, but on a default, confession, demurrer, or on an out-lawry, which is a judgment in itself. After issue joined in a cause, the plaintiff may, if he thinks proper, accept of a judgment from the defendant; but on such a judgment, a writ of error may be had without putting in bail, which cannot be done on a judgment after verdict. All judgments given in courts of record must be entered; in order to which the plaintiff's attorney, four days after the record is brought into court, may, if the judgment is out, enter judgment by the usual course of the court; but he cannot do this sooner, because the defendant must have time to bring in a writ of error, or to find out matter for an arrest of judgment. The defendant may oblige the plaintiff to enter his judgment, in order that he may plead it to any other action; and judgment upon a demurrer to a declaration, &c. which does not pass upon the merits of the cause, is no bar to it, though other judgments may be pleaded in bar to any action brought again for the same thing. Judgments are to continue till they are reversed: but an action of debt will lie on a good judgment, as well after a writ of error is brought, as before it. If a plaintiff does not take out an execution within a year and a day after judgment is obtained, the judgment must be revived by a *scire facias*. See the article **SCIRE FACIAS**.

**JUDGMENTS for crimes**, in case of treason or felony, must be by an express sentence, an out-lawry, or abjuration: and no judgment can be inflicted contrary to law, or that is not appointed by act of parliament. These judgments are of very different kinds; as in high treason the offender is sentenced to be drawn, hanged, his entrails taken out and burnt, his head cut off, and his body quartered, &c. In petit treason the judgment is, to be drawn to the place of execution, and there hanged. But a woman in all cases of high and petit treason, is to be drawn and burnt. All persons for felony, are to be hanged by the neck till dead. Judgment in misprision of treason, is imprisonment for life: and for misprision of felony, the offender is subject to a fine and imprisonment; and for crimes of an infamous nature, the judgments are discretionary in the breast of the

the court, and those guilty are punished by a fine, pillory, &c.

**JUDGMENTS for debts**, are acknowledged by a person's giving a general warrant of attorney to any attorney of the court in which it is to be acknowledged, to appear for him at the suit of the party to whom the same is to be done, and to file common bail, receive a declaration, and then to plead, *non sum informatus*, I am not informed; or to let it pass by *nihil dicit*, he says nothing; upon which judgment is entered for want of a plea. Judges that sign judgment of lands, are to set down the day of the month and year in which they do it; and they shall be good against purchasers only from such signing. Where a person has acknowledged a judgment for the security of money, and afterwards on borrowing more money of another person mortgages his lands, &c. without giving any notice of the judgment to the mortgagee; in such case, if the mortgager do not within six months pay off and discharge the judgment, he shall forfeit his equity of redemption, 4 and 5 Will. and Mary. Acknowledging a judgment in the name of another person without his privacy or consent, is made felony, by 21 Jac. I. c. 26.

**JUDICIUM DEI**, judgment of God, in law, a term applied to the trial by combat, by ordeal, &c. See the articles **DUEL**, **COMBAT**, **ORDEAL**, &c.

**JUDOIGNE**, a town of the austrian Netherlands, in the province of Brabant, situated on the river Gheet, thirteen miles south-east of Louvain, and sixteen north of Namur.

**IVES**, or **St. IVES**, a borough and port-town of Cornwall, situated on the Irish channel: it sends two members to parliament: west long. 6°, north lat. 50° 18'.

**JUGALE**, in anatomy, the cheek bone. See the article **MALA**.

**JUGERUM**, in roman antiquity, a square of 120 roman feet; its proportion to the english acre being as 10000 to 16097. See the article **MEASURE**.

**JUGULAR**, in anatomy, an appellation given to two veins of the neck, which arise from the subclavians. 1. The external jugular, distributed over the external parts of the head; and which, in its several parts, receives different denominations from them, as the frontal, temporal, occipital, &c. vein. 2. The internal jugular, which gives ramifications to the larynx, the pharynx, the muscles

of the os hyoides, and to the tongue; those which are under its vertex being called raninæ. But besides these branches, its trunk terminates in a diverticulum, called the jugular sack, and brings back the blood from the sinuses of the dura mater, and from the brain. See **VEIN**. There are also certain glands in the anterior part of the neck, called jugular. See the article **GLAND**.

**IVICA**, or **YVICA**, the capital of an island of the same name, fifty miles east of Valencia in Spain: east long. 1°, north lat. 39°.

**JUICE**, denotes the sap of vegetables when expressed. See the article **SAP**.

Under this head, Quincy tells us, we have nothing either in official or extemporaneous prescription, unless the acacia and liquorice-juice. See **ACACIA** and **LIQUORICE**.

But besides these, there are other inspissated juices, frequently used in medicine; as scammony, aloes, gamboge, opium, catechu, elaterium, &c. See the articles **SCAMMONY**, **ALOES**, &c.

Juice of lemons, the pipe, pays on importation, 1l. 10s. 4<sup>8</sup>/<sub>100</sub>d. and draws back on exportation, 1l. 8s. 6d. Juice of limes, the gallon, pays, on importation, 2<sup>28</sup>/<sub>100</sub>d. and on exportation draws back 2<sup>13<sup>3</sup>/<sub>4</sub>/<sub>100</sub>d.</sup>

**JUICE** is also used to denote the liquors of animals, as the nervous juice, the pancreatic juice, &c.

**JUJUBES**, *jujuba*, in the materia medica, the name of a fruit of the pulpy kind, produced on a tree called by authors ziziphus, which Linnæus makes a species of rhamnus. See **RHAMNUS**.

This fruit is of an oblong figure, and somewhat resembles a large olive in its shape and size: its usual length is about an inch, and its thickness somewhat more than half an inch. It is wrinkled on the surface deeply and irregularly, and when cut or broken, is found to consist of a thick pellicle, of a dusky yellowish red colour, under which there lies a whitish and soft pulpy fungous matter, enclosing a stone of an oblong figure. It has but little smell, but is of a sweetish and resinous taste. It is to be chosen new, large, plump, and full of pulp, and of a sweet and pleasant taste.

The jujubes have been made a general ingredient in pectoral decoctions; but they are now seldom used on these occasions, and

and are scarce at all heard of in prescription, or to be met with in our shops.

**JULEP**, in pharmacy, a medicine composed of some proper liquor, and a syrup or sugar of extemporaneous preparation, without decoction, designed for the concoction or alteration of the humours, or restoring the strength.

Dispensatory writers mention several kinds of juleps. 1. The camphorated julep, thus prepared: take of camphire, one dram; of double refined sugar, half an ounce; of boiling water, a pint. First grind the camphire with a little rectified spirit of wine, till it is softened; then with the sugar, till they are perfectly united; lastly, add the water by degrees; and, when the mixture has stood in a covered vessel, till it is cold, strain it off.

2. Chalk-julep, thus made: take of the whitest chalk prepared, one ounce; of double refined sugar, six drams; of gum arabic, two drams; of water, a quart. Mix all together. 3. The musk-julep, thus prepared: take of damask-rose-water, six ounces; of musk, twelve grains; of double refined sugar, one dram. Grind the musk and sugar together, and gradually add the rose-water. Besides these, there are several other preparations made up in the form of juleps, and denominated from their uses, balsamic, cephalic, carminative, strengthening, &c. juleps.

**JULIA**, or **JULIS**. See **JULIS**.

**JULIAN**, or **St. JULIAN**, a harbour on the coast of Patagonia, in south America, where ships bound to the South seas usually touch: west long. 74°, north lat. 48° 15'.

**JULIAN PERIOD**, in chronology, a system or period of 7980 years, found by multiplying the three cycles of the sun, moon, and indiction into one another. See the article **CYCLE**.

This period was called the julian, not because invented by Julius Cæsar; since the julian epocha was not received till the year 4669, but because the system consists of julian years. This epocha is not historical, but artificial, being invented only for the use of true epochas: for Scaliger considering that the calculation was very intricate in using the years of the creation, the years before Christ, or any other epocha whatever, in regard that another person could not understand what year this or that writer meant; to remove such doubts in the computation of time, he thought of this period; which commencing 710

years before the beginning of the world, the various opinions concerning other epochas may commodiously be referred to it. See **EPOCHA**.

The most remarkable uses of the julian period are as follow. 1. That we can explain our mind to one another, for every year in this period has its peculiar cycles, which no other year in the whole period has; whereas, on the contrary, if we reckon by the years of the world, we must first enquire how many years any other reckons from the creation to the year of Christ, which multiple-inquisition is troublesome and full of difficulties, according to the method of other periods. 2. That the three cycles of the sun, moon, and indiction, are easily found in this period. 3. That if it be known how the chronological characters are to be found in this period, and how the years of any other epocha are to be connected with the years of it, the same characters also may, with little labour, be applied to the years of all other epochas. See **CHARACTER** and **EPOCHA**.

**JULIERS**, the capital of the dutchy of the same name, situated on the river Roer, twenty miles west of Cologne, and as many east of Maestricht: east long. 6°, north lat. 50° 55'.

**JULIS**, or **JULIA**, in ichthyology, names given to the variegated small labrus, with two large teeth in the upper jaw. See the article **LABRUS**.

**JULPHA**, or *Old JULPHA*, once the capital of Armenia, but now in ruins, the inhabitants being transplanted to a town within a mile of Ispahan, called New Julpha, and there they carry on a foreign trade with all the countries in Asia. The situation of Old Julpha was in east long. 46°, north lat. 39°.

**JULUS**, in botany, the same with what is otherwise called catkins or amentaceous flowers. See **AMENTACEOUS**.

**JULUS** is also the name of an insect very common among rubbish, and called in english the gally-worm: it is furnished with a great number of feet, has the power of rolling itself up like a ball when touched, and is esteemed a very valuable medicine in the jaundice and suppression of urine.

**JULY**, in chronology, the seventh month of the year, so called in honour of Julius Cæsar; before whose time it was known by the name of quintilis, as being the fifth month of the old roman year. See the articles **MONTH** and **YEAR**.

**JUMENTA**,

**JUMENTA**, in zoology, the name by which Linnæus calls the fifth order of quadrupeds, the characteristic of which is, that the teeth of all the animals belonging to it are placed in a different manner from the other five orders. See the article **QUADRUPED**.

To this order belong the elephant, rhinoceros, hippopotamus, horse, and hog. See **ELEPHANT**, **RHINOCEROS**, &c.

**JUNCAGO**, in botany, the same with the triglochim of Linnæus. See the article **TRIGLOCHIM**.

**JUNCOIDES**, in botany, the name by which Micheli calls the juncus.

**JUNCUS**, the **RUSH**, in botany, a genus of the *hexandria-monogynia* class of plants, which has no corolla; but the perianthium, when fresh and coloured, greatly imitates one: the fruit is a coloured capsule, of a triquetrous figure, and formed of three valves, containing a few roundish seeds.

Authors have divided the several species of juncus into what they call rushes, and rush-grasses, from their having or wanting leaves; but the fructifications in both are the same.

**JUNCUS ODORATUS**, a name sometimes given to Schoenanth. See the article **SCHOENANTH**.

**JUNGERMANNIA**, a genus of the *cryptogamia-algae* class of plants, consisting usually of stalks furnished with leaves, disposed in a pinnate or squamose manner, sometimes of leaves only: the male flower stands on a long straight pedicle, which arises out of a calyx growing from the upper part of the surface: it has neither calyx nor corolla, but consists of an anthera, which is at first of an oval figure, but afterwards opens into four segments, and remains in this state a long while on the plant; the female flower has no pedicle, there is no visible calyx or corolla, but all that is seen is a number of seeds lying naked in a cluster, and sometimes only a single one.

This is the *lichenastrum* of Dillenius, and the *muscoides* of Micheli.

**JUNIPER**, *juniperus*, in botany, a genus of the *dioecia-monadelphia* class of plants, without any male corolla; the female flower consists of three rigid and acute petals: the fruit is a roundish, fleshy berry; and the seeds are three oblong offshoots, convex on one side, and angulated on the other.

Juniper-berries are to be chosen fresh, plump, full of pulp, and of a strong

taste; and these, when used in medicine, are powerful attenuants, diuretics, and carminatives: they dissolve viscid humours in the first passages, and are consequently a remedy for the flatulencies which these disorders occasion. They are given in cases of the gravel and other nephritic complaints, in infarctions of the viscera, and in suppressions of the menses, and are often made ingredients in clysters. The berries chewed, or the essential oil taken only in a few drops, give the urine the same sweet violet-scent that it has after taking turpentine. But these berries are not to be given indiscriminately; for in hot habits, they often counteract the very purposes intended to be answered by them, and their use succeeded with heat, and even suppression of urine, flatulencies, and swellings of the stomach and intestines: therefore in all cases, where there is danger of an inflammation, either in the primæ viæ, or in the kidneys, the use of juniper-berries is to be avoided. We keep no preparation of them in the shops, except the essential oil made by distillers with water in the usual way; and this is seldom made at home, but the imported kind is commonly adulterated with oil of turpentine. We used to keep a distilled spirituous water of juniper in the shops, but the vulgar getting an opinion of its being a pleasant dram, the making of it became the business not only of the apothecary, but of the distiller, who sold it under the name of geneva. See the article **GENEVA**.

**JUNK**, in the sea-language, old cables cut into short pieces, and given to boat-swains for making swabs, plats, and nippers; as also to the ship-carpenters, and to poor people, to be picked into oakum, for caulking ships, &c.

**JUNO**, in astronomy, the name by which some call the second of jupiter's satellites. See the article **JUPITER**.

**JUNTA**, **JUNTO**, or **JUNCTO**, in matters of government, denotes a select council for taking cognizance of affairs of great consequence, which require secrecy.

In Spain and Portugal, it signifies much the same with convention, assembly, or board among us: thus we meet with the junta of the three estates, of commerce, of tobacco, &c. See **BOARD**, &c.

**IVORY**, *ebur*, in natural history, &c. a hard, solid and firm substance, of a white colour, and capable of a very good polish. It is the tusk of the elephant, and

is hollow from the base to a certain height, the cavity being filled up with a compact medullary substance, seeming to have a great number of glands in it. It is observed that the Ceylon-ivory, and that of the island of Achem do not become yellow in the wearing, as all other ivory does; for this reason the teeth of these places bear a larger price than those of the coast of Guinea.

The duty on ivory, on its being imported into this kingdom, is  $1s. 11. \frac{10}{100}d.$  the pound, out of which a drawback of  $1s. 8. \frac{25}{100}d.$  the pound, is allowed on its exportation.

*To soften IVORY and other bones*, lay them for twelve hours in aqua fortis, and then three days in the juice of beets, and they will become so soft that they may be worked into any form. To harden them again, lay them in strong vinegar. Dioscorides says, that by boiling ivory for the space of six hours with the root of mandragoras, it will become so soft that it may be managed as one pleases.

*To soften and whiten IVORY*, take white wine vinegar, thrice distilled, and boil red sage leaves in it with a little quick-lime; put in the ivory while the liquor is boiling hot, and it will soon become softer and much whiter than it was before. Ivory may also be whitened and cleaned from spots in the following manner: lay it in quick-lime and pour a little water over it, but not too much, that the heat may not be too great, lest it scale and become brittle.

Ivory distilled in a retort yields a small quantity of an insipid and scentless phlegm; then a larger quantity of a pungent liquor, like spirits of harts-horn; after this comes over a brown foetid oil, and a moderate quantity of volatile salt concretes about the sides of the receiver. These have all the same virtues with the preparations of harts-horn; and the raspings of ivory, in the same manner as the shavings of harts-horn, boil into a jelly with water, and have the same restorative virtues.

*Staining and marbling of IVORY.* 1. Of a fine coral-red; make a lye of wood-ashes, of which take two quarts, pour it into a pan upon one pound of brasil; to this add one pound of alum; boil it for half an hour; then take it off, and put in the ivory or bone, and the longer either of these continue in the liquor, the redder they will be. 2. Of a fine green; take two parts of verdgrease, and one

part of sal-armoniac; grind them well together, pour strong white wine vinegar on them, and putting your ivory into this mixture, let it lie covered till the colour has penetrated, and is as deep as you would have it. If you would have it spotted with white, sprinkle it with wax; or if you would have it marbled, cover it with wax, and scrape it off in veins, having all the lines uncovered which you desire to have stained. 3. Of black; take litharge and quick-lime, of each an equal quantity; put them in rain-water over the fire till it begins to boil; in this put the bone or ivory, stirring them well about with a stick; and afterwards, when you see the ivory receive the colour, take the pan from the fire, stirring the ivory all the while till the liquor is cold. 4. Marbling upon ivory is performed thus; melt bees-wax and tallow together, lay it over the ivory, and with an ivory bodkin open the strokes that are to imitate marbling; pour the solution of some metal on them, and when it has stood a short time, pour it off; when it is dry, cover the strokes again with wax, and open some other veins with your bodkin for another metallic solution; and this repeat to the number of colours you design to give it. The solution of gold gives it a purple; of copper, a green; of silver, a lead-black; of iron, a yellow and brown. By this method you may also imitate tortoise-shell and several other substances on ivory.

**IVORY-BLACK.** See *Ivory*. **BLACK.**

**JUPITER**, ♃, in astronomy, one of the superior planets, remarkable for its great brightness. See the articles **PLANET** and **COPERNICAN SYSTEM**.

Jupiter appears almost as large as Venus, but is not altogether so bright; he is eclipsed by the moon, by the sun, and even by mars. He has three appendages, called zones, or belts, which sir Isaac Newton thinks are formed in his atmosphere. In these are several *macule*, or spots; from whose motion the motion of jupiter round its axis is said to have been first determined. See plate CXLVIII. fig. 3.

Its orbit is situated between those of Saturn and mars, and is therefore called one of the superior planets: it has a rotation round its axis in 9 hours 56 minutes; and a periodical revolution round the sun in 4332 days, 12 hours, 20', 9". It is the biggest of all the planets; its diameter to that of the sun appears, by astronomical observations, to be as



Fig. 1. JUPITER'S MOONS.

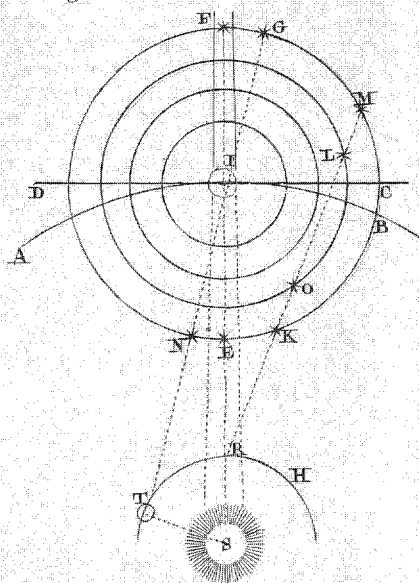


Fig. 2. An Instrument for making ISSUES.

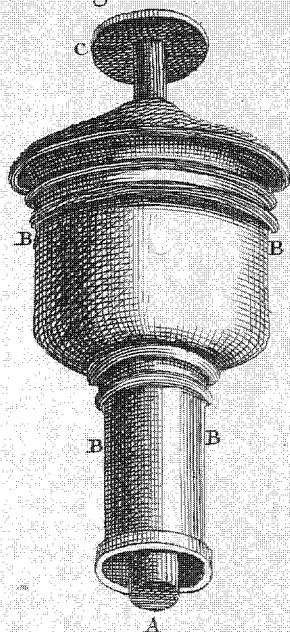


Fig. 3. KEY.

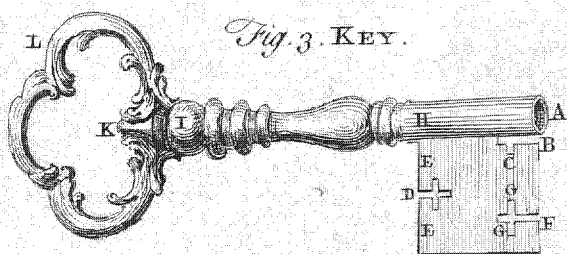
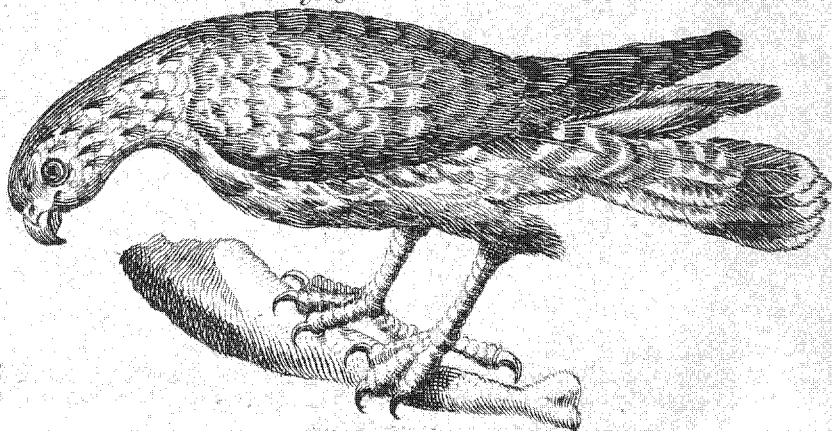


Fig. 4. KEVEL



Fig. 5. KESTRIL.





1077 is to 10000; to that of saturn, as 1077 to 889; to that of the earth, as 1077 to 104. The force of gravity on its surface is to that on the surface of the sun, as 797.15 to 10000; to that of saturn, as 797.15 to 534.337; to that of the earth, as 797.15 to 407.832. The density of its matter is to that of the sun, as 7404 to 10000; to that of saturn, as 7404 to 6011; to that of the earth, as 7404 to 3921. The quantity of matter contained in its body is to that of the sun as 9.248 to 10000; to that of saturn, as 9.248 to 4.223; to that of the earth, as 9.248 to 0.0044.

The mean distance of jupiter from the sun is 5201 of those parts, whereof the mean distance of the earth from the sun is 1000, though Kepler makes it 5196 of those parts. Mr. Cassini calculates jupiter's mean distance from the earth to be 115000 semidiameters of the earth. Gregory computes the distance of jupiter from the sun to be above five times as great as that of the earth from the sun; whence he gathers, that the diameter of the sun, to an eye placed in jupiter, would not be a fifth part of what it appears to us; and therefore his disk would be twenty-five times less, and his light and heat in the same proportion.

The inclination of jupiter's orbit, that is, the angle formed by the plane of its orbit, with the plane of the ecliptic, is  $1^{\circ} 20'$ ; his excentricity is  $\frac{1}{250}$ ; and Huygens computes his surface to be four hundred times as large as that of the earth.

As jupiter is one of the three superior planets, that is, one of the three which are above the sun, hence it has no parallax, its distance from the earth being too great to have any sensible proportion to the diameter of the earth. Though it be the greatest of all the planets, yet its revolution about its axis is the swiftest. Its polar axis is observed to be shorter than its equatorial diameter; and sir Isaac Newton determines the difference to be as 8 to 9; so that its figure is a spheroid, and the swiftness of its rotation occasions this spheroidism to be more sensible than that of any other of the planets.

Jupiter has four moons, or satellites, that attend him, which, at different distances, and with different periods, perform constant revolutions round him; that which is next to him, is no further removed than  $2\frac{1}{2}$  of his own diameters,

and turns round in 1 day, 18 hours and an half. The second, at the distance of  $4\frac{1}{2}$  diameters, describes its orbit in the space of 3 days and 13 hours. The third is removed from jupiter 7 of his diameters, and finishes its circulation in seven days 4 hours. The furthestmost compleats its period in the space of 16 days,  $16\frac{1}{2}$  hours, at the distance of 12 diameters of jupiter. These *jovial* planets were first discovered by Galileo, by the help of the telescope which he first invented, and by them he increased the number of the celestial bodies, and called them medicean stars, in honour of the dukes of Tuscany, with whose name he dignified them.

The orbits of jupiter's moons lie nearly in the plane of the ecliptic, which is the reason why their motion is apparently in a right line, and not circular, as it really is. To understand this, let S (plate CXLIX. fig. 1.) be the sun, T the earth in its orbit TH, I the planet jupiter in his orbit AIB, and in the center of the four orbits of his moons. Then, because the plane of those orbits does nearly pass through the eye, the real motion of the satellite in the periphery will be apparently in the diameter of the orbit, which is at right angles to the line joining the center of the earth and jupiter.

Thus supposing the earth at R, if DC be drawn through the center of jupiter perpendicular to RI, the motion of each moon and their places will appear to be in that line. Thus, if the exterior moon be at E or F, it will appear to be at I either upon or behind the center of jupiter; if the moon move from E to K, it will appear to have moved from I to L; and when it moves from K to C, it will appear to move from L to C. Again, while the satellite moves from C to M, it will appear to move from C to L; and as it goes from thence to F, it apparently moves from L to I. Thus also, on the other side of the orbit, while the satellite describes the quadrant FD, its apparent motion will be from I to D; and then from D to I again, as its comes from D to E.

Whence, since this is the case of each satellite, it appears, that while each satellite describes the remote half of its orbit CFD, its apparent motion will be direct, or from west to east along the line CD; and while it describes the other half DEC, its apparent motion is retrograde, or from east to west back again along the same

line from D to C; so that each satellite traverses the diameter of its orbit twice in each revolution.

These four moons must make a very pleasing spectacle to the inhabitants of jupiter, if there are any; for sometimes they rise altogether, sometimes they are all in the meridian, ranged one under another; and sometimes all appear in the horizon, and frequently undergo eclipses; the observations whereof are of special use in determining the longitude. The day and night are of the same length in jupiter all over his surface, *viz.* five hours each; the axis of his diurnal rotation being nearly at right angles to the plane of his annual orbit. Though there be four primary planets below jupiter, yet an eye placed on his surface would never perceive any of them; unless, perhaps, as spots passing over the sun's disk, when they happen to come between the eye and the sun. The parallax of the sun, viewed from jupiter, will scarce be sensible, no more than that from saturn, neither being much above twenty seconds; so that the sun's apparent diameter in jupiter will not be above six minutes. The outermost of his satellites will appear almost as big as the moon does to us; *viz.* five times the diameter and twenty-five times the disk of the sun. Doctor Gregory adds, that an astronomer in jupiter would easily distinguish two kinds of planets, four nearer him, *viz.* the satellites; and two, *viz.* the sun and saturn, more remote: the former, however, will fall vastly short of the sun in brightness, notwithstanding the great disproportion in the distances and apparent magnitude. From these four different moons, the inhabitants of jupiter will have four different kinds of months, and the number of moons in their year will not be less than 4500. These moons are eclipsed as often as, being in opposition to the sun, they fall within the shadow of jupiter: and again, as often as, being in conjunction with the sun, they project their shadows to jupiter, they make an eclipse of the sun to an eye placed in that part of jupiter where the shadow falls. But in regard the orbits of these satellites are in a plane which is inclined to, or makes an angle with, the plane of jupiter's orbit, their eclipses become central when the sun is in one of the nodes of these satellites; and when out of this position, the eclipses may be total, though not central, because the

breadth of jupiter's shadow is nearly decuple to that of the breadth of any of the satellites; and the apparent diameter of any of these moons is nearly quintuple the apparent diameter of the sun. It is owing to this remarkable inequality of diameters, and the small inclination the plane of the orbits of the satellites has to the plane of jupiter's orbit, that in each revolution there happen eclipses both of the satellites and of the sun; though the sun be at a considerable distance from the nodes. Further; the inferior among these satellites, even when the sun is at the greatest distance from the nodes, will occasionally eclipse and be eclipsed by the sun to an inhabitant of jupiter; though the remotest of them, in this case, escapes falling into jupiter's shadow, and jupiter into his, for two years together. To this it may be added, that one of these satellites sometimes eclipses another where the phasis must be different, nay frequently opposite to that of the satellite falling into the shadow of jupiter just mentioned; for in this the eastern limb immerses first, and the western immerses last; but in the others, it is just the reverse. The shadow of jupiter, though it reaches far beyond its satellites, yet falls much short of the distance of any planet; nor could any other planet, saturn alone excepted, be immersed in it, even though it were infinite. Nor could the shadow of jupiter reach that of saturn, unless jupiter's diameter were half of that of the sun; whereas, in effect, it is not one ninth of it. The courses of jupiter's satellites, and their various eclipses, would render navigation very sure and easy on the globe of jupiter. Even we, at this distance, can make very good use of them: those eclipses being found one of our best means for determining the longitude at sea. See the article LONGITUDE.

**JUREA**, or **JURA**, a strong city in Italy, in the province of Piedmont, situated on the river Doria, subject to the king of Sardinia: east long.  $7^{\circ}$ ,  $36'$ ; north lat.  $45^{\circ}$ ,  $22'$ .

**JURISDICTION**, in law, signifies the power and authority with which any person is invested in administering justice in cases of complaint laid before him. Jurisdictions are either ecclesiastical or secular; ecclesiastical belongs to bishops and their deputies. See **BISHOP**. Secular jurisdiction belongs to the king and his judges. The courts and judges

at Westminster are not restrained to any county or place, they having jurisdiction all over England; but other courts are confined to their particular jurisdictions, which if they go beyond, all their proceedings become erroneous. As to inferior jurisdictions, they are of several sorts; one of which is to hold pleas, and the plaintiff may either sue there or in the king's courts. Another is the conuſance of pleas; where a right is invested in the lord of the franchise to hold pleas. A third kind is an exempt jurisdiction, as where the king grants to the inhabitants of a particular city or corporation, the privilege of being sued only within their own city, &c.

**JURISPRUDENCE**, the science of what is just or unjust; or the knowledge of laws, rights, customs, statutes, &c. necessary for the administration of justice.

**JURIS UTRUM**, in law, is a writ in behalf of a clergyman whose predecessor has alienated the lands belonging to his church. This writ is also granted in order to try whether free alms belong to a church where they are transferred. A successor of a deceased clergyman may also have this writ against a man, who intrudes into lands and tenements; a vicar may also have this writ even against the parson, for the glebe of his vicarage, &c.

**JUROR**, in law, signifies any person sworn on a jury. See the next article.

**JURY**, a certain number of men sworn to enquire into and try a matter of fact, and to declare the truth upon such evidence as shall appear before them.

Juries are, in these kingdoms, the supreme judges in all courts and in all causes in which either the life, property or reputation of any man is concerned: this is the distinguishing privilege of every Briton, and one of the most glorious advantages of our constitution; for as every one is tried by his peers, the meanest subject is as safe and as free as the greatest.

All criminal causes must first be tried by a grand jury, which commonly consists of twenty-four men of greater note than the petit jury, who are chosen indifferently out of the whole county, and no man can suffer the disgrace of being tried in any ignominious cause, without their first finding him guilty; if they find him innocent, he is immediately discharged; but if otherwise, they only find an indictment, on which he is tried, and

finally acquitted or convicted by the verdict of the petit jury, who are not only to be returned from the county where the fact was done, but near neighbours, such as are most sufficient and least suspicious; to prevent partiality, the names of the persons impannelled are wrote on several pieces of paper of equal size, and delivered by the under-sheriff to the judge's martial, who causes them to be rolled up, all in the same manner, and put together in a box, and when any cause is brought to trial, some indifferent person is to draw out twelve of these papers, and the persons whose names are drawn, if not challenged, are to be the jury to try the cause; and in case any are challenged, and set aside, or do not appear, then a further number is to be drawn till there is a full jury. See the article CHALLENGE.

When a jury-man is sworn, he must not depart from the bar on any account whatsoever till the evidence is given, without leave of the court; and if that be obtained, he must have a keeper with him. As soon as the whole evidence is summed up, the jury are to be kept together till they are all of one mind, and unanimous in bringing in their verdict, without being admitted to the speech of any person, and without meat, drink, fire or candle. They are fineable if they agree to cast lots for their verdict, and also for being tampered with in relation to it. But as they are the sole judges of the fact, they are not fineable for giving a verdict contrary to the sentiments of the court; nor even for giving it contrary to what may appear plain evidence, because the law presumes that they may have some other evidence besides what is given in court: but where any corruption appears, a jury may be attainted for going contrary to evidence; and if a juror takes any thing either of the plaintiff or defendant for giving a verdict, he is to pay ten times as much as he has taken, or suffer a year's imprisonment; yet in trying causes, juries are to have their charges allowed them by the court. In all cases of difficulty, it is safest for the jury to find the special matter, and to leave it to the judges to determine how the law stands upon the fact.

Infants, persons of seventy years of age, and upwards, clergymen, apothecaries, &c. are exempted from serving upon juries; and barons, and all above them, are not to serve in an ordinary jury.

jurors, in London, must not only be housekeepers, but must have land or goods worth one hundred pounds; and they may be examined on oath as to that point. 3 Geo. II. c. 25.

The qualifications of a jury-man for a county, is ten pounds *per annum*, either in freehold or copyhold-estate within the same county; but cities, boroughs, and corporate towns, are excepted by the statutes: however, no jury is obliged to appear upon a trial at Westminster where the offence was committed thirty miles off, except it be required by the king's attorney-general. According to usage, the sheriff should return twenty-four jurors, in order to speed the trial in case of challenge, sickness, &c. and should he only return twelve, pursuant to the writ, he is liable to be amerced. By 4 and 5 W. and M. no sheriff, bailiff, &c. under the penalty of ten pounds, shall return any person to serve on a jury, who has not been duly summoned six days before his appearance, nor under the like penalty shall he accept of money or other reward for excusing the appearance of a jurymen: jurymen neglecting to appear, shall be fined in a sum not exceeding five pounds, nor less than forty shillings; except they can give a reasonable excuse for their non-appearance: and, in case a jurymen does appear, but refuses to be sworn, or to give a verdict, an attachment may be issued against him. Lists of jurors, according to the statutes of 4 and 5 W. and M. and 7 and 8 W. III. are now to be made from the rates of each parish, and fixed on the doors of churches, &c. twenty days before Michaelmas, that public notice may be given of persons omitted who are qualified, or of persons inserted who are not so: after which, the lists being settled by the justices of the peace at the quarter-sessions, duplicates are to be delivered to the sheriffs by the clerks of the peace; and the names contained in these lists must be entered alphabetically by the sheriffs in a book to be kept for that purpose, together with their additions and places of abode. The sheriffs are liable to be fined for returning other persons; and also if they return jurors that have served two years before. Sheriffs, on the return of writs of *venire facias*, are to annex a pannel of the names of a competent number of jurors, mentioned in the lists, and not less than forty-eight in any county, nor more than seventy-two, un-

less they are otherwise directed by the judges, which jurors shall be summoned to serve at the assizes, &c.

When it is conceived that an indifferent and impartial jury will not be returned by the sheriff, a special jury is allowed; in which case the court, upon a motion made, will order the sheriff to attend the secondary of the king's bench with his book of freeholders of the county, and the secondary is to mark a jury, in the presence of the attorneys on both sides: also, if a cause of consequence is to be tried, the court of king's bench, on a motion upon an affidavit made, will make a rule for the secondary to name forty-eight freeholders, out of which each party is to strike out twelve, one at a time, the plaintiff's attorney beginning first, and the remainder of the jurors will be the jury for the trial: though the nomination of a special jury ought to be in the presence of the attorneys on each side; yet in case either of them neglects, or refuses to attend, the secondary may proceed, and strike out twelve for the attorney that makes default. By 3 G. II. c. 25. on the motion of the prosecutor, plaintiff or defendant, on trials of issues on indictments, and in all actions whatsoever, the courts of Westminster are authorized to order a special jury to be struck in the same manner as upon trials at bar. Where a special jury is ordered by a rule of court, in any cause arising in a city, corporation, &c. this jury is to be taken out of the lists or books of the persons qualified, which are to be produced by the sheriffs, &c. before the proper officer. The same indulgence is granted both to merchants and foreigners; for where two merchants are plaintiff and defendant, the court may be moved for a jury of merchants to try the issue between them; and if either of the parties in the suit be an alien, the jury, at the desire of the party, is to be composed of half foreigners and half English. See the articles PEERS and VERDICT.

**JURY-MAST**, whatever is set up in room of a mast that has been lost in a storm or in an engagement, and to which a lesser yard, ropes and sails are fixed.

**JUS**, in its general acceptation, signifies law or right.

**JUS ACCRESCENDI**, in law, is the right of survivorship between two joint tenants.

**JUS CORONÆ**, signifies, in general, the rights of the crown. These are a part of the laws of the kingdom, though they

they differ in many things from the general laws relating to the subject. See the article KING.

**JUS DUPLICATUM**, in law, is a double right, and is used when a person has the possession of a thing, as well as a right to it.

**JUS GENTIUM**, the law of nations, or the laws established between different kingdoms and states, in relation to each other. See the article LAW.

**JUS HEREDITATIS**, the right or law of inheritance.

**JUS PATRONATUS**, in the canon-law, is the right of presenting a clerk to a benefice; or a kind of commission granted by the bishop to inquire who is the rightful patron of a church. This commission is directed to six clergymen, and six laymen who reside near the church, and these are to inquire, 1. Whether the church is void? 2. Who made the last presentation? 3. Who is the rightful patron? &c. See the article PATRON.

**JUS POSSESSIONIS**, in law, is a right of seisin or possession, as *jus proprietatis* is the right of ownership of lands, &c.

**JUS PRESENTATIONIS**, in law, the right a patron enjoys of presenting his clerk to the ordinary, to be admitted, instituted, and inducted into a church.

**JUS RECUPERANDI, INTRANDI, &c.** signify a right of recovering and entering into lands, &c.

**JUST**, a sportive combat on horseback, man against man, armed with lances.

The difference between jousts and tournaments, according to Du Cange, consists in this, that the latter is a genus of which the former is only a species. Tournaments included all kinds of military sports and engagements, which were made out of gallantry and diversion. Jousts were those particular combats, where the parties were near each other, and engaged with lance and sword: add, that the tournament was frequently performed by a number of cavaliers, who fought in a body; whereas the joust was a single combat of one man against another. Though the jousts were usually made in tournaments, after a general rencounter of all the cavaliers, yet they were sometimes singly and independent of any tournament.

Antiently jousts and tournaments made a part of the entertainment of all solemn feasts and rejoicings. The Spaniards borrowed these exercises from the Moors, and call them *juego de canas*, reed or

cane-plays. Some take them to be the same with the *ludus trojanus*, antiently practised by the youth of Rome.

He who appeared for the first time at a joust, forfeited his helmet, or casque, unless he had forfeited before at a tournament.

**JUSTICE**, *justitia*, in a moral sense, is one of the four cardinal virtues, which gives every person his due.

**JUSTICE**, *justiciarius*, in a legal sense, a person deputed by the king to administer justice to his subjects, whose authority arises from his deputation, and not by right of magistracy.

In the courts of king's bench and common pleas there are two judges styled justices, each of whom retains the title of lord during the time of his continuing in office. The first of these, who is styled lord chief justice of England, has a very extensive power and jurisdiction in pleas of the crown, and is particularly intrusted not only with the prerogative of the king, but likewise the liberty of the subject. He hears all pleas in civil causes brought before him in the court of king's bench, and also the pleas of the crown; while, on the other hand, the lord chief justice of the common pleas has the hearing of all civil causes between common persons. Besides the lords chief justices, there are several other justices appointed by the king for the execution of the laws; such as the lords justices in eyre of the forests, who are two justices appointed to determine all offences committed in the king's forests; justices of assize, who, by a special commission, were formerly sent to hear causes in this or that county, for the ease of the subject; and these judges continue twice a year to pass the circuits by two and two throughout all England, dispatching the different business they meet with by different commissions; for they have one commission to take assizes, another of oyer and terminer, that is, to hear and determine causes, and another of goal-delivery: from whence they are called justices of oyer and terminer, of goal-delivery, &c. They are also called justices of nisi prius, and so denominated from the words used in a common form of adjournment of a cause in the court of common pleas. See NISI PRIUS.

**JUSTICES of the peace**, are persons appointed by the king's commission to keep the peace of the county in which they reside; and some of these, who are of superior rank or quality, are called justices

justices of the quorum, and without the presence or assent of these, or at least one of them, no business of importance can be dispatched. Justices of the peace ought to be appointed out of the most sufficient persons in the county, as well as those of the greatest reputation. They ought to possess an estate of at least 100*l.* *per annum*, in freehold or copyhold, for life, or for the term of twenty-one years, without incumbrances; and if a justice of the peace, not thus qualified, presumes to act in that office, he is liable to the penalty of 100*l.* Every justice of the peace has a separate authority for doing all the different acts relating to his office, as for commitments, binding to the good behaviour, &c. they are authorized to take informations against persons committing treason, to grant warrants for apprehending them, and committing them to prison: they may also commit all felons in order to bring them to trial; and at the same time, they are to bind over the accusers to prosecute at the assizes: and if they neglect to certify such examinations and informations at the next goal-delivery, or do not bind over the prosecutors, they are liable to be fined. Where any person is esteemed dangerous, and likely to break the peace, a justice may require a recognizance with a large penalty of such person for his keeping the peace, and on his not procuring sureties for his good behaviour, he may send him to prison: but where a person hears of a peace-warrant being out against him, he may go to another justice, and there give surety of the peace, by which means he will prevent his being held on the first warrant. Justices of the peace frequently make up petty quarrels and breaches, where the king is not intitled to a fine; but they are not to take money for making agreements: if a justice is guilty of any misdemeanor, an information will lie against him in the king's bench, where he may be punished by fine and imprisonment. Two or more justices of the peace have power jointly to take indictments, and try offenders at the quarter-sessions: and in many cases they are empowered, by statute, to act where their commission does not extend: they are to hold their sessions four times a year, on the first week after Epiphany, Easter, St. Thomas a Becket, which is the 7th of July, and Michaelmas: at the quarter-sessions they may try persons for petit-larceny, and

other small felonies; but felonies of a higher nature are to be tried at the assizes.

**JUSTICES** *within liberties*, are justices of the peace who have the same authority in cities or other corporate towns, as the others have in counties, and their power is the same, only these last have the assize of ale and beer, wood and victuals, &c.

**JUSTICE-SEAT**, is the highest forest court, always held before the lord chief justice in eyre of the forest; in which court fines are set for offences, and judgments given.

**JUSTICIA**, in botany, a genus of the *diandria monogynia* class of plants, the corolla whereof consists of a single petal; the tube is gibbous; the limb ringent; the upper lip is oblong and emarginated; the lower lip is of the same length with that, and is reflex and obtusely trifid: the fruit is an oblong, obtuse capsule, narrow at the base, composed of two valves, and containing two cells; the partition placed contrarywise to the valves, opens by an elastic unguis: the seeds are roundish.

**JUSTICIAR**, in our old laws, an officer instituted by William the conqueror, as the chief officer of state, who principally determined in all cases civil and criminal. He was called in latin *capitalis justiciarius totius anglie*.

**JUSTICIARY**, or *court of JUSTICIARY*, in Scotland, a court of supreme jurisdiction in all criminal cases.

This court came in place of the justice-eyre or justice-general, which was last in the person of the earl of Argyle, who transacted for it with king Charles I. but being made justice-general of all the islands, which gave rise to great debates between him and some hereditary sheriffs there, that jurisdiction was taken away by parliament in 1672, and was erected into a justice or criminal court, consisting of a justice-general alterable at the monarch's pleasure, justice clerk, and five other judges, who are lords of the session.

This court commonly sits upon Mondays, and has an ordinary clerk, who has his commission from the justice-clerk. They have four macers, and a doomster appointed by the lords of the session.

The form of the process is this: the clerk raises a libel or indictment upon a bill passed by any of the lords of that court, at the instance of the pursuer, against the defendant or criminal, who is immediately committed to prison after citation.

citation. When the party, witnesses, great assize, or jury of forty-five men, are cited, the day of compearance being come, fifteen of the great assize is chosen to be the assize upon the pannel, or prisoner at the bar. The assize sits with the judges to hear the libel read, witnesses examined, and the debates on both sides, which is written verbatim in the adjournal books. The king's advocate pleads for the pursuer, being the king's cause, and other advocates for the pannel. The debates being closed, the judges find the libel or indictment either non-relevant, in which case they desert the diet, and absolve or absolve the party accused; or, if relevant, then the assize or jury of fifteen is removed into a closer room, none being present with them, where they choose their chancellor and clerk, and consider the libel, deposition, and debates; and bring in their verdict of the pannel sealed guilty or not guilty: if not guilty, the lords absolve; if guilty, they condemn and declare their sentence of condemnation, and command the sentence to be pronounced against the pannel by a macer and the mouth of the doomster.

The lords of the justiciary, likewise go circuits twice a year into the country. See the article **CIRCUIT**.

**JUSTICIES**, a writ directed to a sheriff, by virtue of which he is impowered to hold a plea of debt in his county-court for a sum above 40s. tho' by his ordinary power he has only cognizance of sums under 40s.

**JUSTIFICATION**, in law, signifies a maintaining, or shewing a sufficient reason in court, why the defendant did what he is called to answer. Pleas in justification must set forth some special matter: thus, on being sued for a trespass, a person may justify it by proving, that the land is his own freehold; that he entered a house, in order to apprehend a felon; or by virtue of a warrant, to levy a forfeiture; or, in order to take a distress; and in an assault, that he did it out of necessity.

**JUTES**, the antient inhabitants of Jutland, in Denmark.

**JUTLAND**, a peninsula of Denmark, antiently called the Cimbric Cherionese, situated between  $8^{\circ}$  and  $11^{\circ}$  of east long. and between  $55^{\circ}$  and  $58^{\circ}$  of north lat. bounded by the Categate sea, which separates it from Norway, on the north;

by the same sea, which divides it from the danish islands and Sweden, on the east; by Holstein, on the south; and by the German ocean, on the west. It is divided into north and south Jutland; the south being usually called Sleswic. The whole is about 180 miles in length, and 90 in breadth.

**IVY**, *hedera*, in botany, a genus of the *pentandria-monogynia* class of plants, the corolla whereof consists of five oblong, patent petals, with their points bent: the fruit is a globose berry, having only one cell: the seeds are five in number, large, gibbous, and angulated on one part.

The qualities of this plant, in medicine, are drying and astringent; but it is rarely taken inwardly: it is more frequently used externally, for drying and healing achors: the berries are frequently given by the common people as a febrifuge: they purge up and down. A gum that distills from the trunk of the ivy-tree, upon being any ways cut, is reckoned a notable caustic, and is said to destroy the nits of the head.

*Ground-IVY*, *hedera terrestris*. See the article **GROUND-IVY**.

**IXIA**, in botany, a genus of the *triandria-monogynia* class of plants, the corolla whereof consists of six oblong, equal, lanceolated petals: the fruit is a roundish, triquetrous capsule, composed of three valves, and containing three compressed cells, in each of which is a single roundish seed.

**IXORA**, in botany, a genus of the *tetrandria-monogynia* class of plants, the corolla whereof consists of a single petal; the tube is cylindric, very long and slender; the limb is plane, and divided into four oval segments; the fruit is a berry of a roundish figure, with only one cell; the seeds are four in number, convex on one side, and angular on the other.

**JYNX**, the **WRY-NECK**, in ornithology, a genus of bird of the pye-kind, the beak of which is smooth, and the nostrils hollowed: the tongue is very long, and of a rounded form, resembling a worm: the toes are four in number, two before and two behind.

Of this genus there is only one known species, called, from its singular manner of twisting its head about, the wry-neck. It is about the size of a lark, and is called by authors *jynx*, *torquilla*, *turbo*, &c.

## K.

**K**, or *k*, the tenth letter, and seventh consonant of our alphabet; being formed by the voice, by a guttural expression of the breath through the mouth, together with a depression of the lower jaw, and opening of the teeth. Its sound is much the same with that of the hard *c*, or *qu*; and it is used, for the most part, only before *e*, *i*, and *n* in the beginning of words; as *ken*, *kill*, *know*, &c. It used formerly to be always joined with *c* at the end of words, but is at present very properly omitted: thus, for *publick*, *musick*, &c. we say, *public*, *music*, &c. However, in monosyllables, it is still retained, as *jack*, *block*, *mock*, &c. Tho' it is seldom used in words derived from the French, as being altogether wanting in that language, yet we meet with *risk*, *burlesk*, &c. in very good authors, instead of *risque*, *burlesque*: and, indeed, the former orthography is certainly most agreeable to the genius of the english language.

The letter *k* is derived from the greek kappa, *κ* or *κ*; it being unknown to the Romans, tho' we sometimes meet with *kalendæ* instead of *calendæ*.

As a numeral, *K* denotes 250; and with a line over it, *K̄* 250000.

**KAABA**, or **CAABA**. See **CAABA**.

**KABBALA**, or **CABBALA**. See the article **CABBALA**.

**KADARI**, or **CADARI**. See **CADARI**.

**KÆMPFERIA**, in botany, a genus of the *monandria-monogynia* class of plants, the flower of which consists of a single petal, with a long slender tube, and the limb is divided into six segments: the fruit is a roundish and somewhat trigonal capsule with three cells, each containing a considerable number of seeds.

The roots of this plant are the galangals of the shops. See **GALANGALS**.

**KAFFA**, or **CAFFA**. See **CAFFA**.

**KAKENHAUSEN**, a city of Livonia, subject to Russia: east long. 26°, north lat. 57°.

**KALENBURG**, or **CALENBURG**. See the article **CALENBURG**.

**KALENDAR** and **KALENDS**. See the articles **CALENDAR** and **CALENDS**.

**KALI**, **GLASSWORT**, in botany, a genus of the *pentandria-digynia* class of plants,

which has no corolla or flower-petals: the fruit is a globose, unilocular capsule, covered by the cup, and containing a single, large, and spiral seed.

Of the ashes of kali is made soap, glass, alkali-salt, potash, &c. See the articles **SOAP**, **GLASS**, &c.

The method of preparing it is this: when dry, they burn it in certain pits, dug in the ground, which are close covered up with earth, so that no air can come at the fire: by this means the matter is not only reduced to ashes, but made into a very hard stone, like rock-salt, which they are forced to break with hammers to get it out. The best sort is in little dry stones, of a blueish-grey colour, and full of little eyes or holes. See the article **ALKALI**.

**KALIPH**, or **CALIPH**. See **CALIPH** and **CALIPHATE**.

**KALLO**, a town of upper Hungary, situated in a lake twenty miles south-east of Tockay.

**KAM**, **KAN**, or **CHAM**. See the article **CHAM**.

**KAMINECK**, a city of Poland, in the province of upper Podolia, and palatinate of Kamineck, situated on the frontiers of Moldavia: east long. 26° 30', north lat. 48°.

**KANISHIA**, a town situated on the river Drave, in lower Hungary, 100 miles south-west of Buda: east long. 17° 6', north lat. 47°.

**KANOF**, or **KANIOW**, a town of Russia, situated on the river Nieper, in the Ukrain, seventy miles south-east of Kiow: east long. 32°, north lat. 50°.

**KAOLIN**, one of the substances whereof china-ware is made; being no other than a kind of talc reduced to powder, and made into a paste with water.

The peculiar property of kaolin is, that it is very difficultly, if at all vitrifiable: so that being mixed with petunse, a substance easily vitrifiable, the mixture produces a semi-vitrification in the fire, which is what we call china or porcelain. See the article **PORCELAIN**.

Talc, therefore, seems the only substance capable of supplying the place of kaolin, in the manufacture of european porcelain; as being not only very difficultly vitrified,



Vitrified, but keeping its transparency after the action of the most violent fire.

**KASTREL**, or **KESTREL**. See the article **KESTREL**.

**KATOVINDEL**, in botany, the same with the phoenix of Linnæus. See the article **PHOENIX**.

**KAUSBEUREN**, an imperial city of Germany, thirty-two miles south of Augsburg: east long.  $10^{\circ} 45'$ , north lat.  $47^{\circ} 50'$ .

**KAY**, or **KEY**, the same with wharf. See the article **WHARF**.

**KEBLA**, an appellation given by the mahometans to that part of the world where the temple of Mecca is situated, towards which they are obliged to turn themselves when they pray.

**KECKLE**, or **KECKLING**, in the sea-language, is the winding of old ropes about cables, to prevent them from galling.

**KEDGE-ANCHOR**, a small one used in kedging. See the next article.

**KEDGING**, in the sea-language, is when a ship is brought up or down a narrow river by means of the tide, the wind being contrary. To do this, they use to set their fore-course, or fore-top-sail and misen, that so they may flat her about; and if she happens to come too near the shore, they let fall a kedge-anchor, with a hawser fastened to it from the ship, in order to turn her head about; which work is called kedging.

**KEEL**, the lowest piece of timber in a ship, running her whole length from the lower part of her stem to the lower part of her stern-post. Into it are all the lower futtocks fastened; and under part of it, a false keel is often used.

**KEELERS**, among seamen, are small tubs, which hold stuff for the caulking of ships.

**KEELSON**, a principal timber in a ship, fayed within-side cross all the floor-timbers; and being adjusted to the keel with suitable scarfs, it serves to strengthen the bottom of the ship.

**KEEPER of the forest**, an officer that has the chief management of every thing belonging to a royal forest, as well as the government of all the other officers. See the article **FOREST**.

**KEEPER of the great seal**, is a lord by his office, is stiled lord-keeper of the great seal of Great-Britain, and is always one of the privy-council. All grants, charters and commissions of the king under the great seal, pass through the hands of the lord-keeper, for without that seal, many of those grants, &c. would be of no force; the king being, in the interpreta-

tion of the law, a corporation, and therefore passes nothing but by the great seal, which is also said, to be the public faith of the kingdom, being in the highest esteem and reputation.

Whenever there is a lord-keeper, he is invested with the same place, authority, preheminance, jurisdiction, or execution of laws, as the lord chancellor of Great-Britain is vested with.

The lord-keeper is constituted by the delivery of the great seal, &c.

**KEEPER of the privy seal**, is also a lord by his office, thro' whose hands all grants, pardons, &c. pass before they come to the great seal, and even some things pass this officer's hands which do not pass the great seal at all. This officer is also one of the privy-council, yet was antiently called clerk of the privy seal. His duty is to put the seal to no grant, &c. without a proper warrant, nor with warrant where it is against law, or inconvenient, but shall first acquaint the king therewith.

**KEEPERS of the liberties of England**, &c. See **CUSTODES LIBERTATIS**.

**KEIL**, a fortress situated on the Rhine, in the circle of Swabia, in Germany, opposite to Strasburg.

**KEISERWAERT**, a strong town of Germany in the circle of Westphalia, and duchy of Berg, situated on the Rhine, twenty-five miles north of Cologne: east long.  $6^{\circ} 8'$ , north lat.  $51^{\circ} 20'$ .

**KELLINGTON**, a borough-town of Cornwall, thirteen miles south of Launceston, which sends two members to parliament.

**KELP**, a fixed salt, or particular species of pot-ash, procured by burning the weed called kali. See **KALI**.

Kelp, the ton, containing twenty hundred weight, each hundred weight containing 112 lb. pays on importation, 14s. 4  $\frac{13}{100}$  d. and draws back on exportation, 12s. 11  $\frac{25}{100}$  d.

**KELSO**, a town of Scotland, in the shire of Mers, or Roxburgh, situated on the north side the Tweed, twenty miles south-west of Berwick.

**KEMPFERIA**, or **KÆMPFERIA**, in botany. See **KÆMPFERIA**.

**KEMPTEN**, a city of Germany, in the circle of Swabia, situated on the river Iser: east long.  $10^{\circ} 7'$ , north lat.  $47^{\circ} 38'$ .

**KENDAL**, a market-town of Westmoreland, twenty-two miles south-west of Appleby.

**KENKS**, in the sea-language, doublings in a rope or cable, when handed in and cut, so that it does not run easy; or when any rope makes turns or twists, and does not run free in the block, then it is said to make kenks:

**KENSINGTON**, a pleasant village in the county of Middlesex, two miles west of London; where is a royal palace, with large and fine gardens.

**KENT**, a county bounded by the river Thames, on the north; by the ocean, on the east; by Suffex, and the Straits of Dover, on the south; and by Surrey on the west.

**KERMAN**, the capital of the province of Kerman, or Carmania, in Persia: east long.  $56^{\circ} 30'$ , north lat.  $30^{\circ}$ .

**KERMES**, according to the arrangement of Linnæus, is a species of the coccus. See the article *Coccus*.

The female of this species, which is what we know by the name *kermes* in the shops, is, when full grown, of a roundish figure, and of a deep purplish blue colour, covered with a fine whitish or greyish dust, like that on the surface of a ripe plum; in this state it is not easy to distinguish its limbs, or indeed its natural form; its being distended by young at this period altering, and in a manner destroying its figure. It adheres in this state to the leaves and young shoots of the *ilex*, and is collected thence for the shops: before this period, it runs about on the branches, and has its form more regular. The male is a very small fly, which would scarce be thought to belong to the same species, if it were not seen impregnating the females; its body is oblong, its head small, its eyes little and black, and its wings whitish, and full of brown and somewhat rigid nerves. It is the female that is gathered for use.

*Kermes*, as brought to us, is a small roundish body, of the bigness of a pea: when cut, it is found to be a mere membranaceous bag, containing a multitude of little distinct granules, which are soft and juicy. It is a very valuable commodity, and serves to two very great uses; the dyers in scarlet finding it as valuable in their way, as the physicians in theirs. The *kermes* intended for the dyers is best kept whole, only destroying the principle of life in the eggs, by means of vinegar; but that intended for medicinal purposes, is more properly managed in another way: they are to be gathered when fully distended, and

while yet perfectly covered with bloom, and are to be immediately put into a mortar, and bruised to pieces. After which they are to be set in a cool place for seven or eight hours, in which time their juice will be rendered much less tough and viscous than it was on the first bruising; after this, it is to be pressed pretty strongly, in order to get out the whole. The liquor thus drawn, is to be set by for some hours to settle; the clear juice is then to be decanted off, and an equal quantity of fine sugar is to be added to it, with which it is to be boiled over a very gentle fire, to the consistence of a syrup, which is called *kermes-juice* in the shops. It will keep a long time, and the confecton of *alkermes* is generally made from it. See *ALKERMES*.

The *kermes* is in great esteem as a restorative, and is said to strengthen the stomach, and assist digestion, at the same time that it invigorates and enlivens in an uncommon manner. It is also in great esteem among the midwives, as a cordial and strengthener for lying-in-women, and as a preventer of abortions.

The people who prepare *kermes* for the dyers, often let the eggs hatch as they lie in drying, and then sprinkling them with vinegar, they kill them, and form them into a sort of cakes, which keep very well a long time.

**KERMES-MINERAL**, *pulvis carthusianorum*, in pharmacy, a preparation of antimony, made up in the following manner. Take of antimony, four pounds; solution of fixt nitre per deliquium, one pound; rain water, three pounds; boil them two hours, and then filter the boiling decoction through paper; let it stand at rest twenty-four hours, and it will let fall a yellowish or saffron-coloured powder, the fluid becoming clear. This fluid being then poured off by inclination, the powder must be washed by repeated affusions of warm water, and four ounces of spirit of wine being burnt upon it, afterwards kept for use.

This powder, according to Quincy, is a most efficacious deobstruent, and therefore extremely useful in scrophulous obstinate, scorbutic, and all such cases as arise from glandular obstruction, as likewise in chloretic, cachectic, and hysterical habits, where the vitiated crasis of the blood has impaired the *vis vitæ*, and debilitated the secretive powers: it has been recommended also in fevers; but the use of medicines of this class, is not yet enough

enough authorized by experience, to render such a practice eligible.

The doses given, have been from one grain to four; but it is best to begin first with the smallest dose, especially with young persons, as the force of its operation varies greatly in different constitutions.

**KERNING**, among salt-makers, the crytallizing of salt. See **SALT**.

**KERRY**, a county of Ireland, in the province of Munster, bounded by the river Shannon, which divides it from Clare, on the north; by Limeric and Cork, on the east; by another part of Cork, on the south; and by the Atlantic Ocean, on the west.

**KESSEL**, a town of Upper Gelderland, in the quarter of Roermonde, situated on the river Meuse: east long. 6°, north lat. 51° 25'.

**KESTRIL**, or **KASTRIL**, in ornithology, the yellow-legged falcon, with a brown back, a spotted breast, and a rounded tail, with a broad black fascia, towards the end. It is a very beautiful bird, about the size of a pigeon, and very bold. It is known among authors, by the names of *tinnunculus* and *cenchris*, and is also called in english, the *stannel* or *windhover*. See plate CXLIX. fig. 5.

**KETCH-DOLT**, a game with dice and tables, wherein the first throws, and lays down from the heap of men without the tables, more or less, according to what he threw, suppose six deuce; then if the other throw either six or deuce, and draw them not from his adversaries tables to the same point in his own, but takes them from the heap, and lays the ace down, he is *dolted*, and so loseth the game: nay, if he but touch a man of the heap, and then recollect himself, the loss is the same. Good gamesters will never be *dolted*; in which case, they strive who shall fill up their tables first, and he that bears them off first wins the game. See **BACK-GAMMON**.

**KETMIA**, in botany, a genus of plants called by Linnaeus *hibiscus*. See the article **HIBISCUS**.

**KETTERING**, a market-town of Northamptonshire, ten miles north-east of Northampton.

**KETTLE**, a well known metalline vessel, for boiling any thing in.

**KETTLE-DRUMS**, in the art of war. See the article **DRUM**.

**KETCH**, in naval architecture, a vessel with two masts. See **SHIP**.

**KEVEL**, in ship-building, a piece of plank layed against the quickwork on the quarter-deck, in the shape of a semi-circle; about which the running rigging is belaid. See plate CXLIX. fig. 4.

**KEXHOLME**, the capital of the province of the same name in Finland, situated on the lake Ladoga, eighty miles north of Petersburg: east long. 30°, north lat. 61° 30'.

**KEY**, *clavis*, a well known instrument, for opening and shutting the locks of doors, chests, buroes, and the like. See the article **LOCK**.

The names of the several parts of a key are these: A (plate CXLIX. fig. 3.) is the pin-hole, drilled into the end of the shank H; B is the step, or dap ward; C, the hook ward; D, the middle-ward; E E, the cross-ward; F, the main-ward; G G, cross-wards; I, the pot; K, the bow-ward; L, the bow, or handle; and B F E D, &c. the piece of steel containing the wards, is called the bit of the key.

Keys are prohibited to be imported.

**KEY**, in music, a certain fundamental note, or tone, to which the whole piece, be it in concerto, sonata, cantata, &c. is accommodated, and with which it usually begins, but always ends. See **CLEF**.

To get an idea of the use of the key, it may be observed, that as in an oration there is a subject, *viz.* some principal person or thing to which the discourse is referred, and which is always kept in view, that nothing unnatural or foreign to the subject may be brought in, so in every regular piece of music, there is one sound, *viz.* the key, which regulates all the rest. Again, as in an oration there are several distinct articles, which all refer to different subjects, yet so as they may have a visible connection with the principal subject, which regulates and influences the whole; so in music, there may be various subaltern subjects, that is various keys, to which the different parts of the piece may belong: but then they must be all under the influence of the first and principal key, and have a sensible connection with it.

Now to give a more distinct notion of the key, we must observe, that the octave contains in it the whole principles of music, both with respect to consonance and melody; and that if the scale be continued to a doable octave, there will

in that case be seven different orders of the degrees of an octave, proceeding from the seven different letters, with which the terms of the scale are marked. Any given sound therefore, *i. e.* a sound of any determinate pitch of tune, may be made the key of the piece, by applying it to the seven natural notes arising from the division of an octave, and repeating the octave above and below at pleasure : the given note is applied as the principal note or key to the piece, by making frequent closes or cadences upon it ; and in the progress of the melody, no other than these seven natural sounds can be admitted, while the piece continues in that key.

Here too it must be added with respect to the two different divisions of the octave, that a sound may belong to the same key, that is, have a just musical relation to the same fundamental in the one kind of division, and be out of the key in respect of the other. Now a piece of music may be carried through several keys, that is, it may begin in one key, and be led out of that into another, by introducing some sound foreign to the first, and so on to another : but a regular piece of music must not only return to the first key, but those keys too must have a particular connection with the first. It may be added, that those other keys must be some of the natural sounds of the principal key, though not any of them at pleasure.

From the distinctions already observed, it is evident, that there are but two different species of keys, which arise according as we join the greater or lesser third, these being always accompanied with the sixth and seventh of the same species ; the third greater, for instance, with the sixth and seventh greater, and the third lesser with the sixth and seventh lesser. And this distinction is expressed under the name of a sharp key, which is that with the third greater, &c. and the flat key with the third lesser, &c. whence it is plain, that how many different cases soever there be in a piece, there can be but two keys, if we consider the essential difference of keys ; every key being either flat or sharp, and every sharp key being the same as to melody, as well as a flat one. See MODULATION, and HARMONY.

To distinguish accurately between a mode and a key, Mr. Malcolm has given us this definition, *viz.* An octave with all its natural and essential degrees, is a

mode with respect to the constitution or manner of dividing it : but with respect to its place in the scale of music, it is a key. See MODE and MELODY.

KEY, is also used for an index, or explanation of a cipher. See CIPHER.

KEYS of an organ, harpsichord, &c. those little pieces in the forepart of those instruments, by means whereof the jacks play, so as to strike the strings. These are in number twenty-eight, or twenty-nine. In large organs, there are several sets of the keys, some to play the secondary organ, some for the main body, some for the trumpet, and some for the echoing trumpet, &c. in some there are but a part that play, and the rest are only for ornament. There are twenty flits in the large keys, which make half notes. See the article ORGAN, &c.

KEY-STONE of an arch, or vault, that placed at the top or vertex of an arch, to bind the two sweeps together.

This, in the tuscan and doric orders, is only a plain stone, projecting a little ; in the ionic, it is cut and waved somewhat like consoles ; and, in the corinthian and composite orders, it is a console, enriched with sculpture.

Key-stones made in the manner of consoles, and placed projecting in the middle of arches and porticos, are particularly designed to sustain the weight and pressure of the entablature, where it happens to be very great between the columns ; for which reason, they should be made so as to be a real support, and not stand for mere ornaments, as they too frequently do.

KIAM, a great river of China, which, taking its rise near the west frontier, crosses the whole kingdom eastward, and falls into the bay or gulph of Nanking, a little below that city.

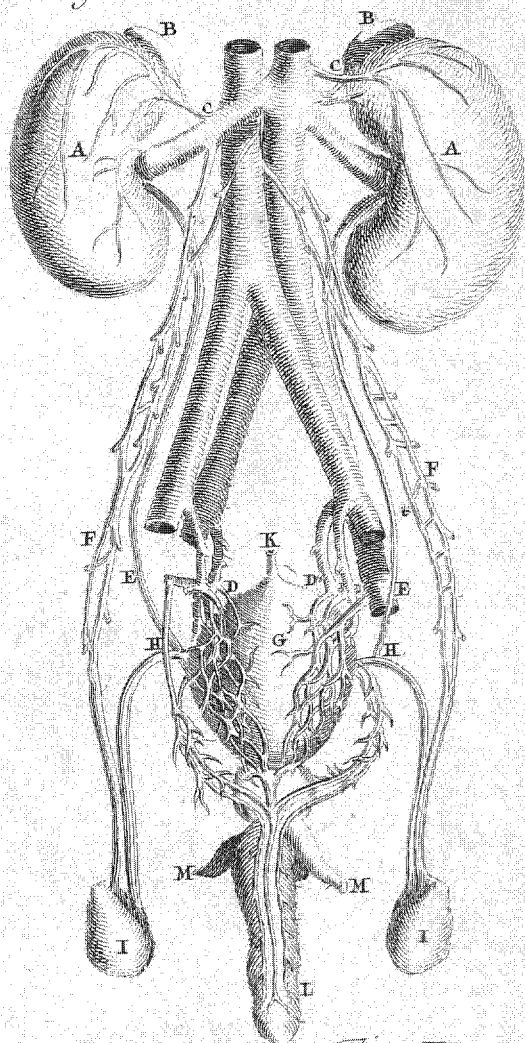
KIAMSI, a province of China, bounded by that of Nanking on the north, and by that of Canton on the south.

KIDDERMINSTER, a market-town twelve miles north of Worcester.

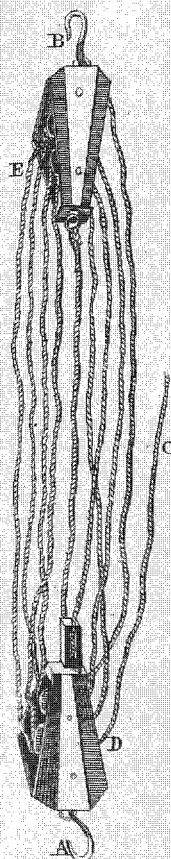
KIDNEYS, *rems.* in anatomy, are two red viscera of an oblong figure, situated at the loins, one on each side ; their hollow side being turned inward, and their convex side outward. They are placed near the lowest spurious ribs ; but their situation is not exactly regular ; for in some subjects they are a little higher, and in others a little lower ; and one of them is not unfrequently placed a little above the other : it is not always the same kidney



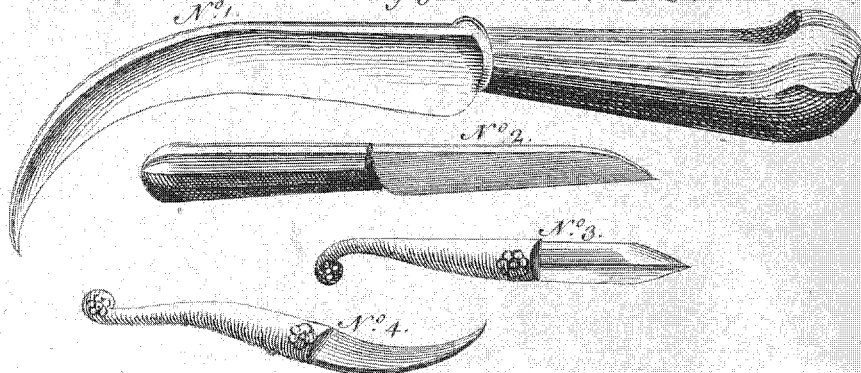
*Fig. 1. The KIDNEYS, &c.*



*Fig. 2 LUXATION of the KNEE.*



*Fig. 3. KNIVES.*



kidney that is placed highest ; but sometimes the right, and sometimes the left ; however, they are sometimes perfectly even.

The kidneys are connected with the loins, the lower ribs, the colon, the succenturiati, the renal vessels, and the ureters. They have two membranes, the one robust and common, called the adipose membrane : this surrounds them but loosely, and is furnished with its own proper vessels. The other membrane is proper, and is very thin, and every where applied closely to the substance of the kidneys.

The length of the kidneys is five or six fingers, the breadth three, and the thickness about a finger and a half. Its surface, in adults, is smooth and equal ; but in the foetus in human subjects, and in grown animals of many kinds, it is irregularly divided, as it were, into a number of lobes.

The vessels of the kidneys, are, like those of the liver, included in a membrane, from the peritonæum. The arteries and veins are large, and called emulgents, and venal vessels ; these are produced from the aorta and vena cava. The nerves are from the plexus renalis ; and there is a large excretory duct, called the ureter. There are also a number of lymphatics, passing to the receptaculum chyli. The substance of the kidneys is firm and hard, and is of two kinds. 1. The exterior, or cortical, which, according to Malpighi, is glandulous ; but according to the discoveries of Ruysch, is throughout elegantly vasculous. 2. The interior, which is tubulous, and expressed by the name of tubuli urinarii Bellini : this terminates in ten or twelve papillæ, which open by a multitude of apertures into the pelvis ; but these papillæ are not found in all subjects.

The use of the kidneys is to secrete the urine from the blood, into the pelvis. See the articles PELVIS, SUCCENTURIATI, URETTERS, BLADDER, and URETHRA. In plate CL. fig. 1. are represented the kidneys, glandulæ succenturiatæ, bladder, and male-organs of generation, with their vessels. A, A, are the kidneys ; B, B, the glandulæ succenturiatæ ; C, C, the emulgent vessels, together with those distributed over the membranes of the kidneys ; D, D, the hypogastric vessels, which branching off from the iliacs, are distributed in the urinary bladder and penis ; E, E, the course of the ureters ;

F, F, the course of the spermatic vessels, in which several appear cut off, being those distributed in the peritonæum ; G, the urinary bladder ; H, H, the vasa deferentia ; I, I, the testicles ; K, the urachus cut off ; L, the penis, M, M, the erector-muscles.

*Inflammation of the KIDNIES.* See the article NEPHRITIS.

**KIGGELARIA**, in botany, a genus of the *dioecia decandria* class of plants, in which the corolla of both the male and female flower consists of five lanceolated, hollow petals ; and its fruit is a coriaceous globose and unilocular capsule, containing a number of roundish seeds.

**KILDARE**, the capital of a county of the same name, in Ireland, twenty-seven miles south west of Dublin.

**KILDERKIN**, a liquid measure, containing two firkins. See the articles FIRKIN and MEASURE.

**KILKENNY**, a county of Ireland, in the province of Leinster, bounded by Queen's County, on the north ; by the county of Wexford, on the east ; by Waterford, on the south ; and by the county of Tipperary, on the west. It is also the name of the capital of that county, and is situated in west long. 7° 15', north lat. 52° 30'.

**KIMBOLTON**, a market-town of Huntingdonshire, nine miles south-west of Huntingdon.

**KINDRED**, in law, persons related to another, whereof the law of England reckons three degrees or lines, *viz.* the descending, ascending, and collateral line. See LINE, DEGREE, DIRECT, &c.

On there being no kindred in the descending line, the inheritance passes to the collateral one. See INHERITANCE.

**KING**, in the general acceptation of the word, is a person who has a supreme authority, with the power of levying taxes, making laws, and enforcing an obedience to them : but in England, which is a limited monarchy, the power of the king is greatly restrained ; which is so far from diminishing his honour, that it adds a glory to his crown ; for while other kings are absolute monarchs over innumerable multitudes of slaves, the king of England has the distinguished glory of governing a free people, the least of whom is protected by the laws : he has great prerogatives, and a boundless power in doing good ; and is at the same time only restrained from acting inconsistently with his own happiness, and that of his people. He has all the ensigns of royal-

ty,

ty, and all the marks of sovereignty : but while he has the power of making treaties, of sending and receiving ambassadors, of conferring titles of honour, creating privy counsellors, officers of state, and judges, and may raise men and arms both for sea and land, he cannot force his subjects to maintain them, or raise one tax by his sole authority : he has the privilege of coining money, but he cannot force the meanest subject to part with his property : he can pardon a criminal, but he cannot put a subject to death, till he is condemned by his peers : he may at his pleasure call, continue, prorogue, and dissolve parliaments, and without his royal assent no bill in parliament can pass into a law ; yet he can neither act contrary to law, nor make new laws by his sole authority ; on the contrary, he may even be sued and cast in his own courts. At his coronation, he takes an oath to govern his people according to the statutes agreed on in parliament, to cause law and justice in mercy to be executed in all his judgments ; to maintain, as much as in him lies, the laws of God, the true profession of the Gospel, and the protestant reformed religion by law established, and to preserve to the bishops and clergy all their rights and privileges. But tho' he may mitigate the rigour of the law, and forgive offenders, he cannot pardon murder, where an appeal is brought by the subject ; nor any other crime, when the offender is impeached by the house of commons. He may lay an embargo on shipping, but then it ought to be for the public good, and not for the private advantage of any particular traders. Writs, processes, commissions, &c. are in his name ; and he has a power not only to make courts, but to create universities, colleges, and boroughs, to incorporate a city or town, and to grant franchises to such corporations ; but they must not, under colour thereof, set up a monopoly. He is esteemed the head of the church ; in him is lodged the supreme right of patronage throughout England, and he may be the founder as well as patron of bishoprics. But notwithstanding these and other prerogatives, the king can take what he has a right to, only by due course of law. In short, he has a principal share in the legislative power, and the whole executive power is lodged in him ; he is supposed present in all his courts, he can do no wrong, and, according to the laws of England, he never dies.

**KING'S BENCH**, a court in which the king was formerly accustomed to sit in person, and on that account was moved with the king's household. This was originally the only court in Westminster-hall, and from this it is thought that the courts of common pleas and exchequer were derived. As the king in person is still presumed in law to sit in this court, though only represented by his judges, it is said to have supreme authority, and the proceedings in it are supposed to be *coram nobis*, that is, before the king. This court consists of a lord chief justice and three other justices or judges, who are invested with a sovereign jurisdiction over all matters, whether of a criminal or public nature. All crimes against the public good, though they do not injure any particular person, are under the cognizance of this court ; and no private subject can suffer any unlawful violence or injury against his person, liberty, or possessions, but a proper remedy is afforded him here ; not only for satisfaction of damages sustained, but for the punishment of the offender : and wherever this court meets with an offence contrary to the first principles of justice, it may punish it. It frequently proceeds on indictments found before other courts, and removed by *certiorari* into this. Persons illegally committed to prison, though by the king and council, or either of the houses of parliament, may be bailed in it ; and in some cases, even upon legal commitments. Writs of *mandamus* are issued by this court, for the restoring of officers in corporations, &c. unjustly turned out, and freemen wrongfully disfranchised.

The court of king's bench is now divided into a crown side and plea-side ; the one determining criminal, and the other civil causes : in the first it determines criminal matters of all kinds, where the king is plaintiff ; such as treasons, felonies, murders, rapes, robberies, riots, breaches of the peace, and all other causes that are prosecuted by indictment, information, &c. On the plea-side, it determines all personal actions commenced by bill or writ ; as actions of debt, upon the case, detinue, trover, ejectment, trespass, waste, &c. against any person in the custody of the marshal of the court, as every person sued here is supposed to be by law.

The officers of this court on the crown-side are the clerk and secondary of the crown ;



crown; and on the side of the pleas there are two chief clerks or prothonotaries, and their secondary and deputy, the custos brevium, two clerks of the papers, the clerk of the declarations, the signer and sealer of bills, the clerk of the rules, clerk of the errors, and clerk of the bails; to which may be added the filazers, the marshal of the court, and the crier.

*Books of KINGS*, two canonical books of the Old Testament, so called because they contain the history of the kings of Israel and Judah, from the beginning of the reign of Solomon, down to the babylonish captivity, for the space of near six hundred years. The first book of Kings contains the latter part of the life of David, and his death; the flourishing state of the Israelites under Solomon, his building and dedicating the temple of Jerusalem, his shameful defection from the true religion, and the sudden decay of the jewish nation after his death, when it was divided into two kingdoms: the rest of the book is taken up in relating the acts of four kings of Judah and eight of Israel. The second book, which is a continuation of the same history, is a relation of the memorable acts of sixteen kings of Judah, and twelve of Israel, and the end of both kingdoms, by the carrying of the ten tribes captive into Assyria by Salmanassar, and the other two into Babylon by Nebuchadnezzar.

It is probable that these books were composed by Ezra, who extracted them out of the public records, which were kept of what passed in that nation.

**KING'S COUNTY**, a county of Ireland, in the province of Leinster, bounded by West-meath on the north, by the county of Kildare on the east, by Queen's county and Tipperary on the south, and by the river Shannon, which separates it from Galway, on the west.

**KING'S FISHER**, *ispida*, in ornithology. See the article *ISPIDA*.

**KINGHORN**, a town of Scotland, on the coast of Fife, nine miles north of Edinburgh.

**KINGSTON**, a market-town of Surry, situated on the river Thames, twelve miles west of London.

**KINGSTON**, a port-town of Jamaica, situated on the north side of the bay of Port-royal: west lon.  $77^{\circ}$ , north lat.  $17^{\circ} 32'$ .

**KINGSTON upon Hull**. See **HULL**.

**KINNOR**, **CINNOR**, or **CINYRA**. See the articles **CINYRA**.

**KINKROSS**, a town of Scotland, in the shire of Fife, situated on the lake of Loch-Leven, twenty miles north of Edinburgh.

**KINSALE**, a port-town of Ireland, in the county of Cork and province of Munster, situated on the river Bandon, fourteen miles south of the city of Cork: west lon.  $8^{\circ} 25'$ , and north lat.  $51^{\circ} 32'$ .

**KIOF**, or **KIOW**, the capital of the Russian Ukraine, on the frontiers of Poland: east lon.  $30^{\circ} 30'$ , and north lat.  $51^{\circ}$ .

**KIRK**, a saxon term, signifying the same with church. See the article **CHURCH**.

**KIRK-MOTE**, a term formerly used for a synod. See the article **SYNOD**.

**KIRK-OSWALD**, a market-town of Cumberland, twelve miles south of Carlisle.

**KIRK-SESSIONS**, an inferior church-judicatory, in Scotland, consisting of the ministers, elders, and deacons of a parish. It regulates matters relating to public worship, catechising, visitations, &c. and judges in cases of fornication and lesser scandals; but adultery, and the like, are left to the presbytery. See **PRESBYTERY**.

**KIRKALDY**, a town of Fifeshire, in Scotland, ten miles north of Edinburgh.

**KIRKHAM**, a market-town of Lancashire, sixteen miles south of Lancaster.

**KIRKUDBRIGHT**, a parliament-town of Scotland, which ranks with Dumfries, Annan, &c. situated on a bay of the Irish sea, sixty miles west of Carlisle: west lon.  $4^{\circ} 5'$ , and north lat.  $54^{\circ} 38'$ .

**KIRKWALL**, the capital of the Orkney-islands, and situated in that of Pomona, is a parliament-town, which classes with Dingwall, Tain, &c. west lon.  $25'$ , and north lat.  $59^{\circ} 45'$ .

**KITCHEN**, a room appropriated for dressing meat, and furnished with suitable accommodations and utensils for that purpose.

*Clerk of the KITCHEN*, an officer of the king's household, whose office is to buy provisions.

**KITCHEN-GARDEN**, a piece of ground laid out for the cultivation of fruit, herbs, pulse, and other vegetables used in the kitchen.

A kitchen-garden ought to be situated on one side of the house, near the stables, from whence the dung may be easily conveyed into it; and after having built the wall, borders should be made under them, which, according to Miller, ought to be eight or ten feet broad: upon those borders exposed to the south, many sorts of early plants may be sown; and upon those

those exposed to the north, you may have some late crops, taking care not to plant any sort of deep-rooting plants, especially beans and peas, too near the fruit-trees. You should next proceed to divide the ground into quarters; the best figures for these is a square, or an oblong, if the ground will admit of it; otherwise they may be of that shape which will be most advantageous to the ground: the size of these quarters should be proportioned to that of the garden; if they are too small, your ground will be lost in walks, and the quarters being enclosed by espaliers of fruit-trees, the plants will draw up slender, for want of a more open exposure. The walks should also be proportioned to the size of the ground; these in a small garden should be six feet broad, but in a larger one ten; and on each side of the walk there should be allowed a border three or four feet wide, between it and the espalier, and in these borders may be sown some small fallads, or any other herbs that do not take deep root, or continue long: but these quarters should not be sown or planted with the same crop two years together. In one of these quarters, situated nearest to the stables, and best defended from the cold winds, should be the hot-beds, for early cucumbers, melons, &c. and to these there should be a passage from the stables, and a gate through which a small cart may enter. The most important points of general culture consist in well digging and manuring the soil, giving a proper distance to each plant, according to their different growths, as also in keeping them clear from weeds; for this purpose you should always observe to keep your dung-hills clear from them; if this is not done, their seeds will be constantly brought in, and spread with the dung.

**KITE**, *milvus*. See **MILVUS**.

**KLEINIA**, in botany, a genus of the *syngnesia-polygamia* class of plants, the compound flower of which is uniform, consisting of about twenty monopetalous infundibuliform floscules, quinque-dentate at the limb; the stamina are five very short filaments; and the seed is single, and crowned with a simple downy filament.

**KNARESBOROUGH**, a borough-town in the north riding of Yorkshire, fifteen miles north of York.

It sends two members to parliament.

**KNAVE**, in old law-books, an appellation given to a man servant, or even to a male child.

**KNAUTIA**, in botany, a genus of the *tetrandria-monogynia* class of plants, the compound flower of which is equal, whereas the proper corolla is unequal, monopetalous, and quadrifid at the limb, with a tube of the length of the cup; the seeds are single, or one for each proper corolla, tetragonal; they are hairy at the top, and contained in a common receptacle.

**KNEE**, *genu*, in anatomy, the articulation of the thigh and leg-bones. See the articles **FEMUR**, **TIBIA**, **PATELLA**, &c. The two principal motions of this joint are flexion and extension: in the former of these the leg may be brought to a very acute angle with the thigh, by the condyles of the thigh-bone being round and smoothed so far backwards; and in performing this, the patella is pulled down by the tibia. When the leg is to be extended, the patella is drawn upwards, and the tibia forwards, by the extensor-muscles, which, by means of the protuberant joint, and this thick bone with its ligament, have the chord with which they act, at a considerable angle, and therefore act with advantage: but, in order that the body may be supported by a firm perpendicular column, they are restrained by the posterior cross-ligament, from pulling the leg farther than to a straight line with the thigh; and when this is done, the thigh and leg are almost as immoveable as if they were one continued bone: but when the joint is a little bent, the posterior ligament is relaxed, and the patella not tightly braced; therefore the superficial cavities of the tibia will allow this bone to be moved a little to either side, or with a small rotation; which is done by the motion of the external cavity backwards and forwards on the internal, which serves as a kind of axis. The rotation of the leg outwards, is of great advantage to us, in crossing our legs on several necessary occasions; though it is wisely ordered by providence, that this motion should not be very great, since this would have occasioned frequent luxations. While all these motions are performing, the only part of the tibia that moves immediately on the condyles, is only so much as is within the cartilaginous rings, which by the thickness of their outfides, make the cavities of the tibia more horizontal, by raising their external side, where the surface of the tibia slants downwards; by which means the motions of this joint are more equal and steady than

than they would otherwise have been. The cartilages are fitted to do this good office in the different motions and postures of the member, by being capable of changing a little their situation ; and this also contributes to make the motions larger and quicker.

*Luxation of the KNEE*, in surgery, is the receding of the tibia from under the lower extremity of the thigh-bone ; which happens sometimes on the outside, sometimes on the inside, and sometimes backwards, but very rarely or never forwards, by reason the patella prevents it.

When the knee is but slightly luxated, the patient is to be seated on a bed, bench, or table, and one assistant is to hold the thigh firm above the knee, and the other to extend the leg, while the surgeon in the mean time replaces the bones by his hand and knee : but when this method is not sufficient, surgeons make use of slings, pulleys, and other instruments. See plate CL. fig. 2. which represents a poly-spaston, or compound pulley, A and B being two hooks, by which the instrument is fastened on both sides ; C, the rope, by drawing which an extension is made in the luxated limb ; and D and E, the two pullies, consisting of several wheels, whereby the force of the drawer is greatly increased. See PULLY.

They ought, however, to be here very careful, lest they make the extension so violent in children and young people, as to separate the epiphyses from the bones, to which they are not yet firmly united, for by that means a worse disorder and lameness will be brought on. After the luxation of the knee is rightly reduced, it is to be properly bound up, and placed in a straw-case ; and the rest must be managed as in the luxation of the patella. See the article PATELLA.

*KNEE*, in a ship, a crooked piece of timber, bent like a knee, used to bind the beams and futtocks together, by being bolted fast into them both. These are used about all the decks.

*Carling-KNEES*, in a ship, those timbers which extend from the sides to the hatchway, and bear up the deck on both sides.

*KNIFE*, a well known instrument, made for cutting.

Surgeons have several kinds of knives ; some for dividing the flesh to the bone, in the upper and lower extremities ; these are commonly falciform, or hooked, as represented in plate CL. fig. 3. n° 1.

though Heister, in most cases, prefers the small straight knife, *ibid.* n° 2. Other incision-knives are double-edged, like that represented *ibid.* n° 3. and, finally, there are other lesser falciform incision-knives, for cutting away excrescences, which the others cannot conveniently reach.

All sorts of knives are prohibited to be imported.

*KNIGHT*, *equus*, among the Romans, a person of the second degree of nobility, following immediately that of the senators. See the article *EQUES*.

Part of the ceremony whereby this honour was conferred, was the giving of an horse ; for each had an horse at the public charge, and received the stipend of a horseman, to serve in the wars.

When the knights were taken in among the senators, they resigned the privilege of having an horse kept for them at the charge of the public : then it became necessary, in order to be a knight, that they should have a certain revenue, that their poverty might not disgrace the order ; and when they failed of the prescribed revenue, they were expunged out of the list of knights, and thrust down among the plebeians. Ten thousand crowns is computed to have been the revenue required.

The knights at length grew so very powerful, that they became a ballance between the power of the senate and people : they neglected the exercises of war, and betook themselves principally to civil employments in Rome.

*KNIGHT*, in a more modern sense, properly signifies a person, who, for his virtue and martial prowess, is by the king raised above the rank of gentlemen, into an higher class of dignity and honour.

Knighthood was formerly the first degree of honour in the army, and usually conferred with a great deal of ceremony, on those who had distinguished themselves by some notable exploit in arms : the ceremonies at their creation have been various ; the principal was a box on the ear, and a stroke with a sword on the shoulder ; they put on him a shoulder-belt, and a gilt sword, spurs, and other military accoutrements ; after which being armed as a knight, he was led to the church in great pomp. Camden describes the manner of making a knight-bachelor among us, which is the lowest, though the most ancient order of knighthood, to be thus : the person kneeling, was gently struck on the shoulder by the prince, and accosted

in these words, "Rise, or be a knight, in the name of God." For the several kinds of knights among us, see the articles *BATCHÉLOW*, *BANNERET*, *BARONET*, *BATH*, *GARTER*, &c.

**KNIGHT** is also understood of a person admitted into any order, either purely military, or military and religious, instituted by some king or prince, with certain marks and tokens of honour and distinction, as the knights of the garter, knights of the thistle, knights of Malta, the knights of the Holy Ghost, &c. all which may be seen under their several heads.

**KNIGHTS-ERRANT**, a pretended order of chivalry, much talked of in old romances, being a kind of heroes that travelled the world in search of adventures, redressing wrongs, rescuing damsels, and taking all occasions of signalizing their prowess. Of this kind of knights was Don Quixote, the hero of a celebrated romance, known by that name. This romantic bravery of the old knights was heretofore the chimerica of the Spaniards.

**KNIGHTS of the shire**, or **KNIGHTS of parliament**, in the british polity, are two knights or gentlemen of estate, who are elected, on the king's writ, by the freeholders of every county, to represent them in parliament.

The qualifications of a knight of the shire, is to be possessed of 600*l.* *per an.* in a freehold estate. Their expences during their sitting, were, by a statute of Hen. VIII. to be defrayed by the county; but this is now scarce ever required.

**KNIGHT-MARSHAL**, an officer in the king's household, who has jurisdiction and cognizance of any transgression within the king's household and verge; as also of contracts made there, whereof one of the house is party.

**KNIGHTS**, in a ship, two thick short pieces of wood, commonly carved like a man's head, having four thivers in each, three for the halcyards, and one for the top-ropes to run in: one of them stands fast bolted on the beams abaft the foremast, and is therefore called the fore-knight; and the other, standing abaft the main-mast, is called the main knight.

**KNOT**, a part of a tree, from which shoots out branches, roots, or even fruit. The use of the knots of plants, is to strengthen the stem: they serve also as sea-scaes, to filtrate, purify, and refine the juices raised up for the nourishment of the plant.

**KNOTS of a rope**, among seamen, are distinguished into three kinds, *viz.* whole-knot, that made so with the lays of a rope that it cannot slip, serving for sheets, tacks, and stoppers: bow-line-knot, that so firmly made, and fastened to the cringles of the sails, that they must break or the sail split before it slips: and sheep-shank-knot, that made by shortening a rope without cutting it, which may be presently loosened, and the rope not the worse for it.

**KNOT of the log line**, at sea, are the divisions of it. See the article *LOG*.

**KNOWLEDGE**, is defined, by Mr. Locke, to be the perception of the connection and agreement, or disagreement and repugnancy, of our ideas. See *IDEA*.

In the introduction to this work, we have given a general distribution of knowledge, according to its objects; and shall here consider it with regard to its foundation, degrees, extent, reality, and manner of improvement.

*Foundation and degrees of KNOWLEDGE.*

There are several ways wherein the mind becomes possessed of truth, each of which is called knowledge.

1. There is actual knowledge, when the mind has a present view of the agreement or disagreement of any of its ideas, or of the relations they have one with another. This is called intuitive knowledge; and whatever is deduced from our intuitive perceptions, by a clear and connected series of proofs, is said to be demonstrated, and produces absolute certainty in the mind; and hence the knowledge, obtained in this manner, is called science, because, in each step of the procedure, it carries its own evidence along with it, and leaves no room for doubt or hesitation. And what is highly worthy of notice, as the truths of this class express the relations between our ideas, and the same relations must ever and invariably subsist between the same ideas, our deductions in the way of science, constitute what we call eternal, necessary, and immutable truths. If it be true that the whole is equal to all its parts, it must be so unchangeably; because the relation of equality being attached to the ideas themselves, must ever intervene where the same ideas are compared. Of this nature all are the truths of natural religion, morality and mathematics, and in general, whatever may be gathered from the bare view and consideration of our ideas. See *INTUITION* and *DEMONSTRATION*.

2. Another

2. Another ground of human knowledge is experience ; from which we infer the existence of those objects that surround us, and fall under the immediate notice of our senses. When we see the sun, or cast our eyes towards a building, we not only have ideas of those objects within ourselves, but ascribe to them a real existence out of the mind. It is also by the information of the senses, that we judge of the qualities of bodies ; as when we say that snow is white, fire hot, or steel hard. For as we are wholly unacquainted with the internal structure and constitution of the bodies that produce these sensations in us, nay, and are unable to trace any connection between that structure and the sensations themselves, it is evident, that we build our judgments altogether upon observation, ascribing to bodies such qualities as are answerable to the perceptions they excite in us. But this is not the only advantage derived from experience, for to that too we are indebted for all our knowledge regarding the co-existence of sensible qualities in objects, and the operations of bodies one upon another. Ivory, for instance, is hard and elastic ; this we know by experience, and, indeed, by that alone : for being altogether strangers to the true nature both of elasticity and hardness, we cannot, by the bare contemplation of our ideas, determine how far the one necessarily implies the other, or whether there may not be a repugnance between them : but when we observe them to exist both in the same object, we are then assured, from experience, that they are not incompatible ; and when we also find that a stone is hard and not elastic, and that air, though elastic, is not hard, we also conclude, upon the same foundation, that these ideas are not necessarily conjoined, but may exist separately in different objects. In like manner, with regard to the operations of bodies one upon another, it is evident, that our knowledge this way is all derived from observation. Aqua-regia dissolves gold, as has been found by frequent trial, nor is there any other way of arriving at the discovery. Naturalists may tell us, if they please, that the parts of aqua-regia are of a texture apt to insinuate between the corpuscles of gold, and thereby loosen and shake them asunder. If this be a true account of the matter, I believe it will, notwithstanding, be allowed, that our conjecture in

regard to the conformation of these bodies, is deduced from the experiment, and not the experiment from the conjecture. To this head we may likewise refer whatever knowledge arises from testimony. See the article EXPERIMENTAL PHILOSOPHY.

3. A third foundation of knowledge is memory : when a man, having once evidently perceived certain truths, he ever afterwards readily assents to them whenever they come to be reflected on. This may be called habitual knowledge, whereby a man may be said to know all those truths which are lodged in his memory, by a former, clear and full perception ; and is of two sorts : the one is of such truths laid up in the memory, as whenever they occur to the mind, it actually perceives the relation there is between those ideas ; and this is in all those truths where the ideas themselves, by an immediate view, discover their agreement or disagreement one with another. The other is of such truths, of which the mind having been convinced, it retains the memory of the conviction without the proofs. Thus a man that remembers certainly, that he once perceived the demonstration that the three angles of a triangle are equal to two right ones, knows it to be true when that demonstration is gone out of his mind, and possibly cannot be recollected ; but he knows it in a different way from what he did before ; namely, not by the intervention of those intermediate ideas whereby the agreement or disagreement of those in the proposition was at first perceived ; but by remembering, that is knowing, that he was once certain of the truth of this proposition, that the three angles of a triangle are equal to two right ones. The immutability of the same relations between the same immutable things, is now the idea that shews him, that if the three angles of a triangle were once equal to two right ones, they will always be so. And hence he comes to be certain, that what was once true is always true ; what ideas once agreed will always agree ; and consequently, what he once knew to be true, he will always know to be true as long as he can remember that he once knew it.

#### *Extent and limits of human KNOWLEDGE.*

1. It is evident that we can have no knowledge farther than we have perception of the agreement or disagreement of our ideas, whether by intuition, demon-

stration, or sensation. 2. We cannot have an intuitive knowledge that shall extend itself to all our ideas and all that we know about them, because we cannot examine and perceive all the relations they have to each other; thus we cannot intuitively perceive the equality of two extensions, the difference of whole figures makes their parts incapable of an exact immediate application. 3. Demonstrative knowledge cannot reach to the whole extent of our ideas, because we cannot always find such proofs as will connect them together, with an intuitive knowledge in all the parts of the deduction. Thus, though we have the ideas of a square, a circle, and equality, yet we, perhaps, shall never be able to find a square exactly to a circle. The affirmations, or negations we make concerning the ideas we have, being reduced by Mr. Locke to these four, *viz.* identity, co-existence, relation and real existence, he examines how far our knowledge extends to each of these.

1. As to identity and diversity, our intuitive knowledge is so far extended as our ideas themselves, and there can be no idea in the mind which it does not presently, by an intuitive knowledge, perceive to be what it is, and to be different from any other.

2. As to the agreement or disagreement of our ideas of co-existence, our knowledge herein is very defective, though the greatest and most material part of our knowledge concerning substances consists in it.

As to the powers of substances, which makes a great part of our enquiries about them, our knowledge reaches little further than experience, because they consist in a texture and motion of parts which we cannot by any means come to discover.

3. As to the third sort, the agreement or disagreement of our ideas in any other relation; this is the largest field of knowledge, and it is hard to determine how far it may extend. This part depending on our sagacity in finding intermediate ideas, that may shew the habits and relations of ideas, it is difficult to tell when we are at an end in such discoveries.

4. As to the fourth part of knowledge, *viz.* of the real actual existence of things, we have an intuitive knowledge of our own existence, a demonstrative knowledge of the existence of God, and a sensitive knowledge of the objects that

present themselves to our senses. See the article EXISTENCE.

*Reality of human KNOWLEDGE.* It is evident, says Mr. Locke, that the mind knows not things immediately, but by the intervention of the ideas it has of them. Our knowledge therefore is real only so far as there is a conformity between our ideas and the reality of things. But how shall we know when our ideas agree with things themselves? It is answered, there are two sorts of ideas that we may be assured agree with things: these are,

1. Simple ideas; which, since the mind can by no means make to itself, must be the effect of things operating upon the mind in a natural way, and producing therein those perceptions which, by the will of our maker, they are ordained and adapted to. Hence it follows, that simple ideas are not fictions of our fancies, but the natural and regular productions of things without us really operating upon us, which carry with them all the conformity our state requires, which is to represent things under those appearances they are fitted to produce in us. Thus the idea of whiteness, as it is in the mind, exactly answers to that power which is in any body to produce it there. And this conformity between our simple ideas and the existence of things, is sufficient for real knowledge. See IDEA.

2. All our complex ideas, except only those of substances, being archetypes of the mind's own making, and not referred to the existence of things as to their originals, cannot want any conformity necessary to real knowledge.

3. But the complex ideas which we refer to archetypes without us, may differ from them, and so our knowledge about them may come short of being real, and such are our ideas of substances. These must be taken from something that does or has existed, and not be made up of ideas arbitrarily put together, without any real pattern. Herein, therefore, is founded the reality of our knowledge concerning substances, that all our complex ideas of them must be such, and such only, as are made up of single ones, as have been discovered to co-exist in nature; and our ideas being thus true, though not perhaps very exact copies, are the subjects of real knowledge of them. Whatever ideas we have, the agreement we find they have with others, will be knowledge: if those ideas be abstract, it will

will be general knowledge; but to make it real concerning substances, it must be taken from the real existence of things: wherever therefore, we perceive the agreement or disagreement of our ideas, there is certain knowledge, and wherever we are sure these ideas agree with the reality of things, there is certain real knowledge.

*Improvement of human KNOWLEDGE.* The sentiments of the same author upon the improvement of our knowledge are as follow: it being the received opinion among men of letters, that maxims are the foundations of all knowledge, and that sciences are each of them built upon certain *præcognita*, from whence the understanding was to take its rise, and by which it was to conduct itself in its enquiries in the matters belonging to that science, the beaten road of the schools was to lay down, in the beginning, one or more general propositions called principles or foundations, whereon to build the knowledge that was to be had of that subject.

That which gave occasion to this way of proceeding, he supposes to have been the good success it seemed to have in the mathematics, which of all other sciences have the greatest clearness, certainty, and evidence in them; but if we consider it, we shall find that the great advancement and certainty of real knowledge men arrive at, in these sciences, was not owing to the influence of these principles, but to the clear, distinct, and complete ideas their thoughts were employed about, and the relation of equality and excess so clear between some of them, that they had an intuitive knowledge, and by that a way to discover it in others, and this without the help of those maxims. See the article *AXIOM*.

The way to improve in knowledge, is not to swallow principles with an implicit faith, and without examination, which would be apt to mislead men, instead of guiding them into truth; but to get and fix in our minds clear and complete ideas, as far as they are to be had, and annex to them proper and constant names, and thus barely by considering our ideas, and comparing them together, and observing their agreement or disagreement, their habitudes and relations, we shall get more true and clear knowledge by the conduct of this one rule, than by taking up principles, and thereby putting the mind into the disposal of others.

We must, therefore, if we proceed as reason activities, adapt our methods of in-

quiry to the nature of the ideas we examine, and the truth we search after. General and certain truths are only founded in the habitudes and relations of abstract ideas; therefore a sagacious methodical application of our thoughts, for the finding out these relations, is the only way to discover all that can with truth and certainty be put into general propositions. By what steps we are to proceed in these, is to be learned in the schools of the mathematicians, who from very plain and easy beginnings, by gentle degrees, and a continued chain of reasonings, proceed to the discovery and demonstration of truths, that appear at first sight above human capacity. This may reasonably be said, that if other ideas, that are real as well as nominal essences of their species, were pursued in the way familiar to mathematicians, they would carry our thoughts farther, and with greater evidence and clearness, than probably we are apt to imagine.

In our knowledge of substances, we are to proceed in quite a different method; the bare contemplation of their abstract ideas (which are but nominal essences) will carry us but a very little way in the search of truth and certainty: here experience much teach us what reason cannot, and it is by trying alone that we can certainly know what other qualities co-exist with those of our complex idea; for instance, whether that yellow, heavy, fusible body we call gold, be malleable or not, which experience (however it prove in that particular body we examine) makes us not certain that it is so in all or any other yellow, heavy, fusible bodies, but that which we have tried; because it is no consequence, one way or other, from our complex idea. As far as our experience reaches, we may have certain knowledge, and no farther. It is not denied, but that a man accustomed to rational and regular experiments, shall be able to see farther into the nature of bodies and their unknown properties, than one that is a stranger to them; but this is only judgment and opinion, not knowledge and certainty. This makes our author suspect that natural philosophy is not capable of being made a science from experiments and historical observations: we may draw advantages of ease and health, and thereby increase our stock of conveniences for this life; but beyond this, he fears, our talents do not reach, and guesses that our faculties are

not

not able to advance farther. See the article EXPERIMENTAL PHILOSOPHY.

The ways to enlarge our knowledge as far as we are capable, seem, to be these two: the first is, to get and settle in our minds, as far as we can, clear, distinct, and constant ideas of those things we would consider and know. For it being evident, that our knowledge cannot exceed our ideas; where they are either imperfect, confused, or obscure, we cannot expect to have certain, perfect, or clear knowledge. The other is the art of finding out the intermediate ideas, which may shew us the agreement or disagreement, or repugnancy, of other ideas, which cannot be immediately compared. That these two, and not the relying on maxims, and drawing consequences from some general propositions, are the right method of improving our knowledge in the ideas of other modes, besides those of quantity, the consideration of mathematical knowledge will easily inform us; where we shall find, that he who has not clear and perfect ideas of those angles or figures, of which he desires to know any thing, is thereby utterly incapable of any knowledge about them.

Our knowledge, as in other things, so in this also, has so great a conformity with our sight, that it is neither wholly necessary, nor wholly voluntary. Men that have senses, cannot choose but receive some ideas by them; and if they have memory, they cannot but retain some of them; and if they have any distinguishing faculty, they cannot but perceive the agreement or disagreement of some of them, one with another: as he that has eyes, if he will open them by day, cannot but see some objects, and perceive a difference in them, yet he may choose whether he will turn his eye towards an object, curiously survey it, and observe accurately all that

is visible in it; but what he does see, he cannot see otherwise than he does: it depends not on his will to see that black, which appears yellow. Just thus it is with our understanding; all that is voluntary in our knowledge is the employing or withholding any of our faculties from this or that sort of objects; and a more or less accurate survey of them; but they being employed, our will hath no power to determine the knowledge of the mind one way or other; that is done only by the objects themselves, as far as they are clearly discovered.

**KNOXIA**, in botany, a genus of the *tetrandria-monogynia* class of plants, the flower of which consists of a single infundibuliform petal; and its seeds are two, and sulcated.

**KOLLOW**, the name of a black kind of earth found in several parts of the kingdom. See the article EARTH.

**KONINGSBURG**, a city of Poland, the capital of ducal Prussia and of the king of Prussia's polish dominions, situated on the river Pregel, near a bay of the Baltic sea, seventy miles north-east of Dantzick: east lon. 21°, and north lat. 54° 40'.

**KORAN**, or **ALCORAN**. See **ALCORAN**.

**KOS**, in jewish antiquity, a measure of capacity, containing about four cubic inches: this was the cup of blessing, out of which they drank when they gave thanks after solemn meals, like that of the passover.

**KUR**, the ancient Cyrus, a river of Persia, which rises in the mountains of Georgia, and running south-east by Teflis, unites its streams with the river Arras (the ancient Arraxes) and falls into the Caspian sea, south of Baku.

**KUTUCHTA**, among the Calmuc-Tartars, the name of their high-priest, or sovereign pontiff; formerly only the deputy of the delai-lama, or high-priest of the Tartars, but at present independent on him.